CDM

City of Wilmington

Management, Operations, and Maintenance Evaluation

November 2006

CDM

City of Wilmington

Management, Operations, and Maintenance Evaluation

November 2006

Contents

Executive Summary

The City of Wilmington's wastewater collection system dates back to approximately 1887, when the City constructed a system of sewers designed to convey wastewater from the downtown area to the adjacent Cape Fear River. The next century brought many improvements to this system including the construction of 2 wastewater treatment facilities and 30 wastewater pump stations. The James A. Loughlin Plant (Northside Plant) and the M'Kean Maffitt Plant (Southside Plant) currently treat all wastewater produced by the City's homes, commercial establishments, and industries. With a combined capacity of 20 million gallons per day (MGD), the two plants also treat wastewater from New Hanover County Water and Sewer District and the Town of Wrightsville Beach. The City's wastewater collection system consists of approximately 360 miles of gravity pipeline, 24 miles of force mains, 30 pump stations, and 10,400 manholes.

Purpose

Sanitary sewer overflows (SSOs) are discharges of untreated sewage from wastewater collection systems. The North Carolina Department of Environment and Natural Resources (NC DENR) and the United States Environmental Protection Agency (USEPA) have determined that sanitary sewer overflows result in the release of wastes to the environment that can pose public health risks, threaten drinking water supplies, and threaten habitat for fish and other aquatic species. Recent SSOs in the City's system have demonstrated sufficient need for the City to evaluate the current condition of the wastewater collection system and take action to improve the performance of the system.

In response, the City has undertaken a number of initiatives to improve the integrity, operation, and overall performance of the City's wastewater collection system. All of these initiatives have been focused on the reduction of SSOs. Acting on these initiatives, the City has determined that there is a need to review its existing programs and practices related to the management, operation, and maintenance (MOM) of the wastewater collection system. The findings of this review are presented in this report, along with recommendations for improvements to programs and practices which may result in further reducing the frequency and volume of avoidable SSOs from the City's wastewater collection system.

Summary of Recommendations

An overview of the collection system infrastructure is presented in Section 2 of the report. Section 3 presents an overview of the organization and management of the collection system and includes some considerations for the future consolidation of the City's utilities with New Hanover County. Sections 4 and 5 present an evaluation of the collection system management, operation, and maintenance; and, finally, Section 6 presents a discussion of performance indicators.

The following is a summary of recommendations made for the MOM evaluation. Each of these recommendations is discussed in detail in Sections 4 and 5 of the report and are only briefly stated here.

Management Recommendations

This section addresses management recommendations for the City's MOM evaluation.

Interconnection Agreement Recommendations

The System-Wide Collection System Permit (SWCSP) gives the City the authority to address flows from interconnected systems that discharge to the City's collection system. It is recommended that the City implement a strategy to locate, identify, and map all interconnections between neighboring systems. Specific interconnection agreements should be formally approved for any current or future interconnection. Issues that should be addressed and regulated in these agreements are discussed in Section 4.2.2.

Rates and Budget Recommendations

It is recommended that the Department of Public Utilities use level-of-service parameters as described in Section 4.3.1 of the report to monitor the allocation of resources for all functions concerning wastewater collection system maintenance that support the City's SSO reduction program.

It is recommended that the City periodically, and on a recurring basis, conduct a cost-of-service analysis of the City's schedule of rates, fees, and charges to ensure that the schedule is adequate and equitable.

Recognizing that existing sewers are fixed assets that require continual renewal and replacement, it is recommended that the City evaluate the funding sources for rehabilitation and replacement. The goal of this evaluation should be to ensure the adequacy of the current funding system in meeting the needs of the collection system.

The Department of Public Utilities should also budget for capital projects using level-of-service parameters to support budget recommendations to the City, as described in Section 4.3.2 of the report.

Human Resources Recommendations

It is recommended that the City continue to conduct job classification and salary studies on a periodic basis to ensure that the City continues to provide competitive wages and benefits for attracting, developing, and retaining high-quality employees. As part of these surveys, the City should identify benchmark practices for implementing pay-for-performance incentives for high-performing employees.

When establishing benefit and salary ranges, the City should consider the formal training, experience, and certifications required to fill certain positions (i.e.,

wastewater and water operators). These positions are often difficult to fill and normally require several years of experience to become functional in key roles. For these reasons, it may be more difficult to recruit potential applicants for these positions.

It is recommended that the City consider using an apprenticeship program to train Wastewater Treatment and Collection System Operators as described in Section 4.4. The City should consider an analysis of apprenticeship programs already in place in the City as well as programs used in other cities.

Worker Health and Safety Recommendations

In order to ensure workers in the Department of Public Utilities are familiar with the City's safety policies and procedures, it is recommended that the Department prepare a supervisory safety manual and employee pocket safety guide. This guide should be conveniently sized to assist employees with carrying the guide daily.

It is recommended that each division of the Department of Public Utilities prepare standard site-safety inspection forms to document the findings of field visits. These field visits should be both scheduled and unscheduled in order to ensure that adequate safety measures are being followed and should be performed on a frequent basis.

Computerized Maintenance Management System (CMMS) Recommendations:

1) The Datastream 7i CMMS has been partially integrated into two divisions, to date. It is recommended that the representatives of all divisions of the City re-review the business protocols, data identification protocols, and integration schedule to verify that the original business objectives of the program are being achieved and determine whether those protocols need to be reevaluated. Once the business practices have been reevaluated and revised as necessary, it is recommended that the City continue the roll-out of the CMMS to all applicable departments and divisions.

2) It is recommended that the CMMS be developed in such a way that each type of action could be recalled for a specific time period and specific location. This system could then provide specific SWCSP information by reference code. This ability would ensure that collection system data could be used for system analysis and NC DENR annual audits.

3) When defining assets in the CMMS, a unique facility ID should be assigned to each asset. The CMMS should also have the ability to interface with GIS using this unique facility ID. This unique facility ID could then be used by GIS to track work orders by specific location or overall area such as an entire outfall line or multi-family housing development instead of just a single location.

4) It is also recommended that the City accelerate the roll-out by hiring temporary staff to help collect appropriate data (field data) and populate the CMMS for all departments. Once the new CMMS is fully operational, it is recommended that the City reevaluate the labor required for database management and SWCSP compliance.

5) It is recommended that staff workshops be provided to communicate the business plan for the use of the CMMS and how department and division personnel will be affected. Furthermore, these workshops should provide formal, structured training in the use of the CMMS to all appropriate employees.

6) The GIS department should be included in the business planning re-evaluation to ensure that the CMMS will integrate seamlessly with the GIS system and to assist in coordinating the timing of the integration.

GIS Recommendations

1) It is recommended the City populate the GIS in a more timely manner, by either:

    a) Hiring one additional qualified GIS staff member dedicated only to data conversion and field data collection, or

    b) Contracting external professional services for GIS data conversion and field data collection.

2) In order to accurately locate and map all collection system components, it is recommended that the Utility Services Division hire and train one additional staff member for the use of Global Positioning Systems (GPS). Along with hiring this staff member, Utility Services should purchase a GPS unit with sub-meter accuracy to allow for accurate field location of collection system components. This staff member should work closely with GIS personnel to ensure that all components of the collection system are located and mapped correctly.

3) Establish a method of recording and tracking assets through a unique ID. At this time all City departments use a different ID or addressing system. Therefore, the GIS personnel have difficulties linking information and reconciling databases.

4) Evaluate the current GIS training program for its effectiveness and take necessary steps to provide a beneficial training program for all City users of the GIS system.

5) Interface the new CMMS with the GIS system to provide a means for constant updates within the mapping of the collection system. Currently, Datastream does not automatically integrate with the GIS system and requires dual entry for all information.

6) Develop a method and specific communication plan of updating the GIS system based on the markups in the map books used by Utility Services' supervisors and field personnel.
7) Require engineers, developers, and builders to provide electronic drawings for sewer system projects with specific written standards as discussed in Section 4.6.2.

SSO Reporting Recommendations

It is recommended that all SSOs continue to be recorded into a database which contains both reportable and non-reportable events.

It is recommended that the City develop a state-approved digital SSO reporting form that transmits an electronic copy of the form to NCDENR, stores the information in a database, and interfaces with the City's GIS system to identify maintenance and overflow trends in the system.

Customer Complaints Tracking Recommendations

The SWCSP also requires that adequate records of all complaints pertaining to the collection system be maintained. In addition, customer complaint tracking can be beneficial to assessing the condition and needs of the collection system.

It is recommended that the City implement a system-wide customer complaint monitoring system that can be used to trend customer complaints, audit emergency response procedures, and identify areas requiring system upgrades and process improvements, as discussed further in Section 4.8. Until such a system is implemented, it is recommended that all Public Utility divisions establish practices of generating work orders immediately upon receiving complaints. This ensures that all complaints are tracked and recorded in a systematic process as discussed further in Section 4.8.

Public Relations Recommendations

It is recommended that the City and the Department of Public Utilities continue to allocate resources to public relations and public education programs using all available media sources to provide effective communications to customers on key issues.

In order to adequately educate the public regarding all issues surrounding the Department of Public Utilities including SSOs, it is recommended that the Department of Public Utilities designate one person with the responsibility of ensuring that the public is educated and informed on all major public utility events (good and bad). The goal of this individual should be to establish a formal proactive agenda on public education that creates a strong sense of ownership in the water and wastewater customers. This person should work closely with the City Communications Officer to accomplish these tasks.

It is also recommended that the City convene a stakeholders' focus group consisting of representatives from a variety of water and sewer customer groups and other parties with a related interest. The purpose of the focus group would be to provide guidance to the City regarding the customers' expected level of service and provide input on the corresponding fee level.

It is further recommended that all Public Utilities personnel receive annual training on public relations. All utility personnel work for the public and, therefore, should be trained to effectively communicate with the public. This training should be undertaken at the departmental and division level.

Design, Permitting, and Easement Acquisition Recommendations

It is recommended that the City's sewer system design standards be reviewed with the personnel from the Wastewater Treatment and Utility Services Divisions to ensure that the standards, materials, and review procedures specified are satisfactory and consistent with O&M goals. In addition, it is recommended that written standard operating procedures be developed for conducting design reviews for all projects.

It is recommended that the City reevaluate the levels of compensation offered for land acquisition. Land prices in the City of Wilmington have risen significantly over recent years and these levels may not be adequate when compared to the actual market value.

It is also recommended that the City increase the amount of public education relating to utility easements in areas of planned construction. Educational activities should be coordinated with the City Communications Officer and the Department of Public Utilities staff member assigned to public education as recommended in Section 4.9 of this report.

Capacity Analysis and Facility Planning Recommendations

It is recommended that the City commission a comprehensive system capacity analysis. The objective of the analysis will be to define areas of the system that are receiving excessive infiltration and inflow volumes, areas of the system that appear to be at-risk for capacity-related sewer overflows, and sewer segments that appear to have insufficient hydraulic capacity to convey system flows. Section 4.11 includes further information and recommendations regarding the system capacity analysis, hydraulic modeling, and capacity allocation.

It is also recommended that the City track key benchmarking parameters such as "budget/mile", "staff/mile", "budget/lift station", etc., and, as the City grows, use these parameters to support the addition of resources. These staffing and budget indicators are further discussed in Section 6.

Operations and Maintenance Recommendations

This section summarizes the operations and maintenance recommendations for the City's MOM evaluation.

Emergency Response and Corrective Maintenance Recommendations

It is recommended that the Utility Services Division begin a systematic approach to providing the necessary equipment to respond to and repair collection system problems as required in the SWCSP. This approach should also include provisions for redundancy in frontline equipment. Redundancy would allow for decreased cost associated with contractor fees and lost time due to lack of equipment.

It is recommended that the City increase sewer stop capabilities by taking several actions.

1) Increase the day-time sewer stop crew size by one person. This additional staff member would reduce the number of times other crews and supervisors are required to assist the sewer stop crew and greatly increase the efficiency of sewer cleaning operations.

2) Provide an additional sewer stop truck that would 1) provide redundancy in the event that one truck was out of service, 2) be available during times when simultaneous responses were required, and 3) permit preventive maintenance flushing of problem areas when sewer stop calls diminish.

3) Provide closed-circuit television (CCTV) capabilities as standard equipment on the sewer stop truck. This would allow for decreased labor and equipment costs for a CCTV truck to visit the site, and it would allow the sewer stop crews to visually verify all line clearing activities.

A designated person(s) should review all CCTV performed after cleaning to identify, record, and address problems as discussed in Section 5.2.2.

General Preventive Maintenance Recommendations

The Utility Services Division should obtain resources for dedicated preventive maintenance of the collection system. Currently, less than 5 percent of resources are used for preventive maintenance and over 95 percent for corrective maintenance. A long-term goal should be to approach 80-percent preventive maintenance and 2-percent corrective maintenance.

Easement Recommendations

Rights-of-way and easements shall be properly maintained to allow accessibility to the collection system per the SWCSP. In order to comply with this requirement, the following recommendations should be implemented:

1) The City should initiate a program to secure the needed resources to safely clear the heavy vegetation from collection system easements. This program is described in more detail in Section 5.2.1 of the report.

2) It is also recommended that the Utility Services Division obtain additional resources to clear, inspect, and maintain easements. One option for additional resources is to contract out the initial clearing. Then, a designated Utility Services easement crew of at least three full-time staff members would need to be hired and adequate mowing equipment purchased to maintain and inspect the easements, once cleared.

3) It is recommended that the City develop a method of accessing marshy areas to inspect and maintain easements. This might include such equipment as additional mats for supporting tracked equipment, amphibious all-terrain vehicles manufactured similar to "Argo" amphibious vehicles, and other equipment intended for these purposes.

4) The City should also develop an easement inspection and maintenance plan. This plan should include SOPs, SMPs, and training for easement clearing, mapping, tracking, etc. Easement clearing efforts should be documented in a database and the GIS system updated to flag sewers that are located in easements.

Sewer Cleaning Recommendations

According to the SWCSP, the City must hydraulically or mechanically clean at least 10 percent of the wastewater collection system per year. Although the City is exceeding this 10 percent minimum, the City should implement the following to reduce the number of SSOs experienced:

1) Implement one cleaning crew solely dedicated to scheduled preventive maintenance cleaning.

2) Provide, at minimum, a second line cleaning crew. This crew would be scheduled for preventive maintenance cleaning but would be available for stoppages when needed.

3) Provide two new combination jet/vacuum trucks to replace the existing line cleaning trucks. Consideration should be made to retaining one of the current trucks for use as a backup.

4) Document areas cleaned and efficiency of cleaning operation through the GIS and/or CMMS. Preventive maintenance cleaning could be automatically assigned by the new Datastream work order system.

Inspection Recommendations

Collection system inspections are required in the SWCSP to prevent malfunctions, deterioration, operator errors, and discharges that may cause or lead to SSOs. Many

methods of inspections can be performed including visual, smoke-testing, CCTV, and other technologies.

The Department of Public Utilities should integrate the manhole inspections into the GIS and Datastream system to ensure that all manhole inspections are documented electronically and problem areas identified.

The Utility Services Division should consider pursuing a smoke testing program if the results of the proposed system-wide temporary flow monitoring program indicate inflow problems in parts of the collection system.

Utility Services should implement a uniform procedure for CCTV inspection and interpretation, especially regarding documentation of the condition of pipelines, and procedures for documenting, tracking, and recording information pertaining to where and when CCTV has been performed, as well as the condition of the sewers inspected. It is suggested that inspection and repair guidelines be used similar to the standards developed by the National Association of Sewer Services Companies (NASSCO).

Root Control Recommendations

Building on the previous study performed by the Environmental Services Division, the City should include a list of effective and suitable chemicals that can be used to successfully control root and vegetative growth in the collection system as discussed in Section 5.2.4.

Areas of the collection system with known root-related problems should be prioritized, and Chemical Root Control should be performed for these areas. The treated areas should be tracked by GIS/Datastream to determine the short- and long-term effectiveness of the root control program.

Sewer Rehabilitation Recommendations

The City should increase sewer rehabilitation efforts to a minimum of 1 to 2 percent per year. This recommendation is based on the fact that the longevity of the sewer is on average 50 to 100 years, so at the rate of 1 to 2 percent per year, it would still take 50 to 100 years to rehabilitate the entire sewer system. With a total length of approximately 370 miles, 1 to 2 percent would be approximately 3.70 to 6.40 miles of rehabilitation per year.

In addition, the sewer rehabilitation budget and work performed should be divided between two parallel programs based on the goal of the rehabilitation: structural and maintenance-driven rehabilitation and comprehensive rehabilitation for I/I reduction. These programs are discussed in greater detail in Section 5.3 of the report.

New Construction Recommendations

The City should take necessary actions to ensure that the 1-year warranty inspections are completed for all new construction projects.

Additional standards should be developed to address the workmanship of contractors and sub-contractors on capital projects. This type of standard would need to be very precise in its methodology and should require the worst case scenarios to be applied during the tests.

Along with addressing City-funded projects, the City should develop a policy approach to addressing private side infiltration and inflow that consists of the following at a minimum:

- The City Sewer Use Ordinance should include language that makes the introduction of non-wastewater related flows (e.g., stormwater, groundwater) illegal with potential enforcement actions by the city including fines and/or discontinuation of service
- The City should employ code enforcement personnel who have the responsibility of enforcing against this and other water and wastewater codes.
- Under the proposed sewer system smoke testing program, infiltration and inflow sources located on private property (e.g. defective or broken service clean-outs) should be identified and recorded.
- Property owners should be notified of violations and given a eriod of time to correct the deficiency.

In areas where private side inflow and infiltration is suspected of causing downstream capacity problems during wet weather, a more aggressive approach may be warranted.

Pump Station Recommendations

It is recommended that the Wastewater Treatment Division hire at least one instrumentation technician to maintain and repair pump station controls. Many of the electronic and digital components and controls in use in the pump stations are beyond the knowledge and scope of the City's electricians.

When implementing the new Datastream database, the City should consider adding preventive maintenance items in addition to the manufacturer's recommended service. The cost/savings associated with preventive maintenance of the pump stations should also be tracked with the assistance of the new Datastream system.

Pretreatment Recommendations

It is recommended that the City continue to maintain the current level of excellence in its pretreatment program. Routine quality assurance procedures should be performed in the pretreatment section to ensure that the City's Sewer Use Ordinance is enforced.

It is further recommended that the City continue to locate potential significant industrial users (SIUs) that have previously failed to be identified. The USEPA

provides guidance for locating SIUs in their pretreatment program development information.

FOG Recommendations

The SWCSP requires that the City educate and enforce the proper operation and maintenance of all grease traps and septic tanks connected to the wastewater collection system. This program should target both residential and commercial users.

It is recommended that the City implement inspection and enforcement measures for multi-family residences. While this may require changes to the City code, these measures could lead to a reduction of a large amount of grease being contributed to the City sewer system and, therefore, potentially reduce SSOs.

Equipment Management and Fleet Management Recommendations

A re-evaluation of the prioritization system of fleet management should be performed, as further discussed in Section 5.7. Vehicles critical to preventing SSOs and protecting public health should be high priority.

The City should consider implementation of a system that transitions repairs of priority vehicles to a contracted repair garage when the elapsed time of a vehicle in for repairs exceeds a predetermined number of days.

It is also recommended that the City document and track spare parts inventory and standardize equipment as much as possible to make it easier to stock the necessary supplies of spare parts and limit downtime of equipment.

Section 1
Introduction

Sanitary sewer overflows (SSOs) are discharges of untreated sewage from wastewater collection systems. Sanitary sewer overflows can result from a variety of causes including, but not limited to, excessive infiltration and inflow, pump station failures, insufficient conveyance capacity, and hydraulic restrictions caused by tree roots, debris accumulation, collapsed pipes, and excessive fats, oils, and grease.

The North Carolina Department of Environment and Natural Resources (NCDENR) and the United States Environmental Protection Agency (USEPA) have determined that SSOs can pose public health risks and can contaminate waters; thereby threatening drinking water supplies, recreational areas, and habitats for fish and other aquatic species. In a report to the United States Congress in 2004, the USEPA estimated that between 23,000 and 75,000 SSOs occur each year in the United States resulting in releases of between 3 billion and 10 billion gallons of untreated wastewater.

1.1 Purpose

Recent SSOs in the City of Wilmington have demonstrated sufficient need for the City to evaluate the current condition of the wastewater collection system and that action must be taken to improve the performance of the system. The City has also acknowledged that regulatory requirements for wastewater collection systems are becoming more stringent at the state and federal level, with a trend toward a zero-tolerance policy for "avoidable" SSOs – SSOs caused by inadequate management, operation, and maintenance or that exceed an agreed upon design capacity. In response, the City has undertaken a number of initiatives to improve the integrity, operation, and overall performance of the City's wastewater collection system – all of which have been focused on the reduction of SSOs.

During the fiscal year from July 1, 2004 through June 30, 2005, the City of Wilmington only reported 2 overflow events totaling approximately 5,000 gallons. However, on July 1, 2005, the City reported one of the largest SSOs in the City's history. The 3-million gallon release of untreated wastewater into Hewlett's Creek not only brought the wastewater collection system to the top of the City's priorities but also captured the attention of local citizens, the media, and regulatory agencies.

Acting on the initiatives to improve the wastewater collection system's performance, the City of Wilmington has undertaken an assessment of its current wastewater collection system program. The tasks performed during the assessment include a Management, Operations, and Maintenance Evaluation; a Sewer Condition and Criticality Rating that will be used to develop project priorities; a Preliminary Sanitary Sewer Condition Assessment and Rehabilitation Plan; and a Sewer Rehabilitation Improvements Plan and Strategy. These tasks are all designed to produce a plan of action that identifies a capital improvement plan to meet immediate needs as well as a long term rehabilitation strategy for the City.

As stated above, the City of Wilmington has determined that there is a need to evaluate its existing programs and practices related to the management, operation and maintenance of the City's wastewater collection system. The findings of this review are presented in this report, along with recommendations for improving programs and practices which may result in further reducing the frequency and volume of avoidable overflows discharged from the City's wastewater collection system.

This report describes the City's programs and the steps taken to reduce SSOs. It also makes numerous recommendations for improvements to the management, operations, and maintenance of the collection system. The Sewer Rehabilitation Improvements Plan and Strategy which is also being developed will focus on developing a recommended capital improvements plan to address immediate sewer rehabilitation needs, including priorities, schedules, recommended rehabilitation techniques and approaches, and estimated costs to perform the recommended work.

1.2 Regulatory Considerations

USEPA and NCDENR have acknowledged, and confirmed, that SSOs cannot be completely eliminated, and that sanitary sewer systems that are designed to accommodate a given design storm (frequency and duration), may nonetheless experience wet-weather induced overflows as a result of rainfall conditions that exceed the design storm. These are referred to as "unavoidable" overflow events.

However, the USEPA and NCDENR believe that inadequate management, operation, and maintenance of wastewater collections systems is the greatest cause of SSOs across the nation. These are referred to as "avoidable" SSOs. In general, the regulatory requirements for wastewater collection systems are becoming more stringent at the state and federal level, with a trend toward a zero-tolerance policy for "avoidable" SSOs.

In an attempt to reduce the number and volume, of "avoidable" SSOs, NC DENR and the USEPA have implemented two regulatory programs.

- North Carolina Department of Environment and Natural Resources (NCDENR) System-Wide Wastewater Collection System Permit (Section 1.2.1), and
- USEPA Region IV Capacity, Management, Operation and Maintenance (CMOM) Program (Section 1.2.2).

The City of Wilmington was issued a NCDENR System-Wide Wastewater Collection System Permit (SWCSP) in 2001. At this time, the City has not been required to participate in a USEPA CMOM program. However, the City has performed this Management, Operations, and Maintenance Evaluation as a proactive strategy to assist in reducing SSOs.

1.2.1 NC DENR Wastewater Collection System Permit

In July 1999, the North Carolina General Assembly ratified House Bill 1160 (1999 N.C. Session Law 329) Section 11.2 of Part XI which states NCDENR shall develop and implement a permit program for municipal and domestic wastewater collection systems on a system-wide basis over a 5-year period starting July 1, 2000. The permanent rules for a holistic collection system permit were developed with the assistance of a stakeholder group, were adopted in September 2000, and approved by the Rules Review Committee in October 2000. The permit program mandates that wastewater utilities provide system performance standards; design and construction criteria; a capital improvements program; management, operations, and maintenance requirements; and minimum reporting requirements.

The City of Wilmington was issued a SWCSP by the NCDENR in 2001. Appendix A contains a copy of this permit. This permit expired on June 30, 2006. As of November, 2006, NCDENR is renewing this permit and could include additional actions resulting from Wilmington's SSOs.

1.2.2 USEPA CMOM

Under the draft regulations proposed by the USEPA, the nation's sewer systems that have a National Pollution Discharge Elimination System (NPDES) permit may be required to implement a capacity, management, operations, and maintenance (CMOM) program under pending SSO regulations. The proposed CMOM regulations will require system agencies to report regularly on system efficiency and is intended to indicate the condition of a municipality's collection system and require the agency to self-audit system capacity during both dry and wet weather. Reporting would also include overall system management activities, such as mapping, maintenance tracking, training, and supervision and provide operational efficiency data, as measured in spending and equipment performance.

The premise of the CMOM program is that when a utility incorporates good business principles into its organization, its wastewater collection system will meet the intended performance standards and result in fewer SSOs. In general, the CMOM program places the burden of proof on the system owner to demonstrate that by using pipes, pumps, and infrastructure with adequate capacity, and properly managing, operating and maintaining the system, SSOs are being prevented to the maximum extent practical. In general, the CMOM program consists of ten components as follows:

- Municipality's Goals
- Municipality's Organization, Responsibilities, and Chain of Communications
- Legal Authority of Municipality's CMOM Programs
- Measures and Activities
- Design and Performance Provisions
- Monitoring, Measurement, and Program Modifications

- Program Elements including an overflow emergency response plan, system evaluation and capacity assurance plan, and program audits
- Reports including immediate notification and follow-up reports, discharge monitoring reports, and annual report.
- Record Keeping
- Additional Public Notification

Although the City of Wilmington is not required or requested at this time to participate in a USEPA CMOM audit, the City is proactively performing this Management, Operations, and Maintenance Evaluation as part of the Sewer Condition Assessment to determine functional areas that can be improved to maximize the effectiveness of the collection system. Since there are many similarities between a CMOM program and the requirements of the City's SWCSP, conducting this CMOM evaluation will prepare the City for confirmed compliance with both program requirements.

1.3 Organization of Report

This report is organized as follows:

Section 1 Introduction

Section 2 Overview of Collection System Infrastructure

Section 3 Collection System Organization and Management

Section 4 Evaluation of Collection System Capacity and Management,

Section 5 Evaluation of Collection System Operations and Maintenance

Section 6 Performance Indicators

1.4 Acknowledgements

The preparation of this Sewer Condition Assessment would not have been possible without the team effort by all participants listed below. CDM would like to thank each one for their valuable contribution.

Charles Adam	Pam Ellis	Phil Peacock
Jack Barajas	Carl Farmer	Liz Penley
Dolores Bradshaw	Terry Fowler	Jim Sahlie
Mike Bowman	Jessie Gidley	Frank Styers
Hugh Caldwell	Kip Glazier	Bob Skaggs
Jeff Cermak	Belinda Jarrad	Malissa Talbert
Sterling Cheatham	Bill Justice	Ed Thorpe
Dan Check	Art Kenan	William Toney
David Cowell	Al Mckenzie	Milton Vann
		Ken Vogt

Section 2
Overview of Collection System Infrastructure

The City of Wilmington's wastewater collection system dates back to approximately 1887, when the City constructed a system of sewers designed to convey wastewater from the downtown area to the adjacent Cape Fear River. The next century brought many improvements to this system including the construction of two wastewater treatment facilities and 30 wastewater pump stations. The James A. Loughlin Plant (Northside Plant) and the M'Kean Maffitt Plant (Southside Plant) currently treat all wastewater produced by the City's homes, commercial establishments, and industries. With a combined capacity of 20 million gallons per day (mgd), the two plants also treat wastewater from New Hanover County Water and Sewer District and the Town of Wrightsville Beach. The City's wastewater collection system consists of approximately 360 miles of gravity pipeline, 24 miles of force mains, and 10,400 manholes.

2.1 Service Area Boundaries

The City's collection system has grown along with the population growth in Wilmington and the merger and acquisition of smaller municipal water and sewer systems near the City. The City of Wilmington's wastewater collection system currently has approximately 25,450 service connections including residential, commercial, and industrial customers. Along with these service connections, there are also interconnected collection systems that contribute wastewater to the City's collection system. Currently, the following jurisdictions contribute to the daily flow of wastewater conveyed by the City's collection system:

- The city limits of Wilmington
- The town limits of Wrightsville Beach
- Portions of New Hanover County

In September 2005, the City of Wilmington and New Hanover County adopted a Concurrent Resolution regarding their intent to consolidate their water and sewer utilities. As of November 2006, the City and County were studying the feasibility, conditions, and impacts of this merger.

2.2 Collection System Assets

There are currently approximately 360 miles of gravity sewer ranging from 4-inch to 48-inch in diameter and approximately 24 miles of force main ranging from 4-inch to 30-inch in diameter. **Table 2-1** contains estimates of gravity sewer length by diameter from the City's Geographical Information System (GIS). **Table 2-2** contains estimates of force main length by diameter from the City's GIS system. **Table 2-3** contains estimates of approximate sewer age.

Table 2-1
Gravity Sewer Length (in miles) By Diameter

	4-inch to 6-inch	8-inch	10-inch to 21-inch	24-inch to 36-inch	48-inch	Total
Miles	21	275	53	11	1	360
% of total	5.8%	76.5%	14.7%	2.9%	0.2%	100%

Table 2-2
Force Main Length (in miles) By Diameter

	4-inch	6-inch	8-inch to 12-inch	18-inch to 21-inch	24-inch to 30-inch	Total
Miles	1	2	7	2	12	24
% of total	4.2%	8.3%	29.2%	8.3%	50.0%	100%

Table 2-3
Sewer Age

	>55 Years	30-55 Years	15-30 Years	<15 Years	Unknown
Estimated Percentage of Sewer Length Falling in Each Age Range	25.9%	42.4%	24.6%	5.4%	1.7%

Although the collection system functions primarily by gravity flow, there are 30 pump stations in the system that conveys the wastewater to the wastewater treatment plants.

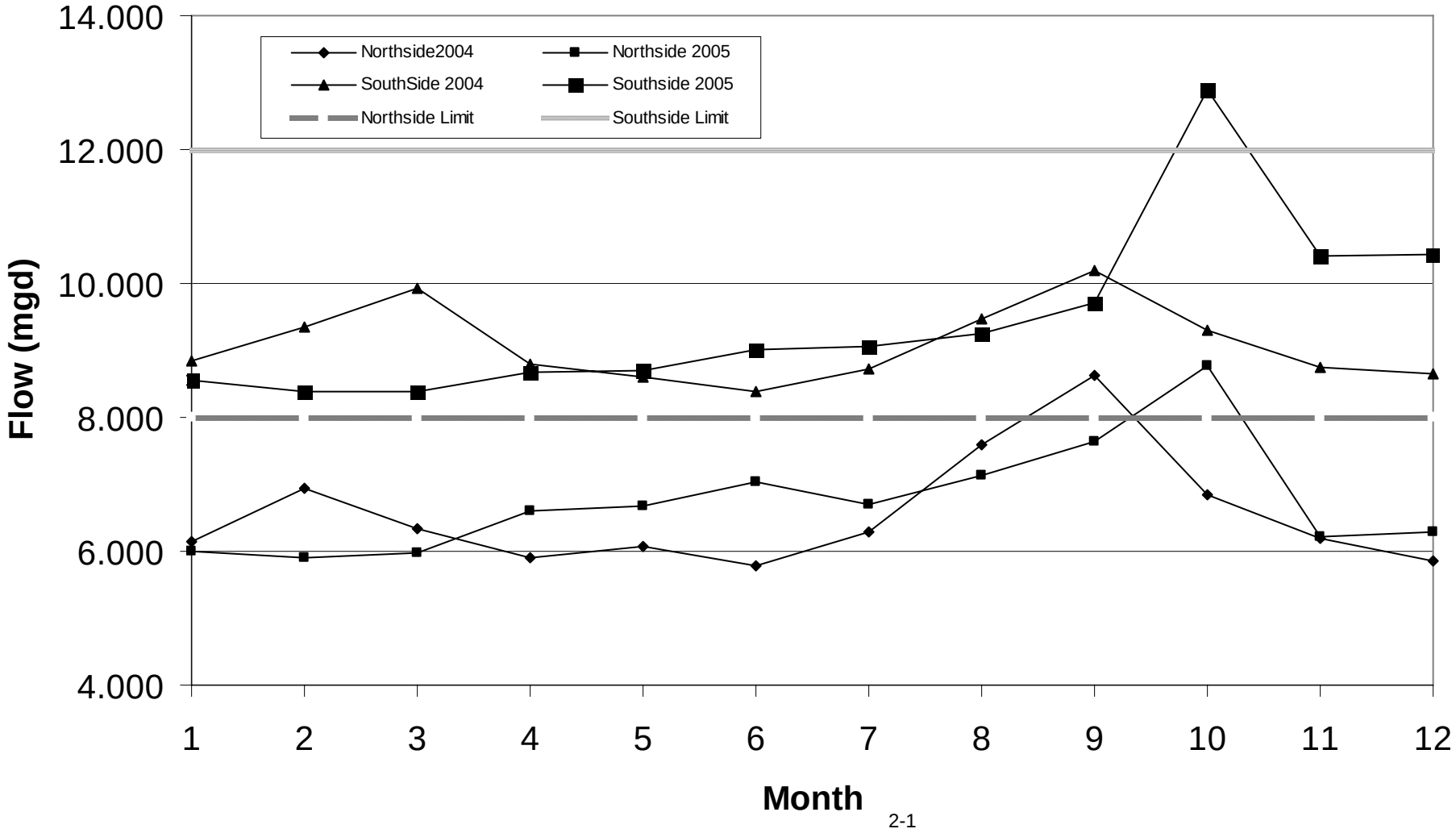
2.3 Collection System Flows

The flow from the collection system is treated at two separate wastewater treatment facilities. The James A. Louglin Plant (Northside Plant) and the M'Kean Maffitt Plant (Southside) currently treat all wastewater collected by the City. With a capacity of 8 mgd, the James A. Loughlin Plant currently treats an average daily flow of approximately 6.74 mgd while the M'Kean Maffitt Plant has a capacity of 12 mgd and currently treats an average daily flow of approximately 9.41 mgd. The James A. Loughlin Plant is currently under construction to expand its capacity to 16 mgd. Both of the City's wastewater treatment plants use physical, chemical, and biological processes to remove pollutants from the wastewater and stabilize sludge for disposal.

The highest average wastewater flows throughout 2004 and 2005 resulted from two naturally occurring conditions. The first condition resulting in these increased

average wastewater flows in the City's collection system is tropical storm events. The City's geographical location along the southeastern coast of the United States places Wilmington in a prime location for hurricanes and tropical storms. These intense storms typically occur in the late summer and early fall and produce torrential rainfalls and devastating storm surges. The rainfall and storm surge not only increase the amount of immediate inflow into the collection system but elevate the ground water level for extended periods of time leading to more infiltration into the collection system. The second condition resulting in increased average wastewater flows is due to elevated groundwater levels during the winter and spring from the effects of evapotranspiration. When the leaves fall off the trees, evapotranspiration rates drop and groundwater levels rise. The higher groundwater contributes more infiltration into the collection system during the winter and spring thus increasing flows. The effects of both of these natural conditions are evident in **Figure 2-1.**

Figure 2-1
Wastewater Treatment Plant Flow Data for 2004 & 2005



Section 3
Collection System Organization and Management

3.1 City of Wilmington

The City of Wilmington operates under the Council-Manager form of government. In this form of government, the seven-member governing board is elected on a non-partisan basis, and the mayor serves as a member and presiding officer of the council. The key responsibility of the governing board is to establish community goals and objectives.

The City Manager, appointed by the City Council, is the chief executive officer for City government and manages the activities of all City departments including the Public Utilities Department. The key responsibilities of the City Manager are to work jointly with the City Council to implement the stated goals and objectives of the council and to administer the daily operations of the City.

For wastewater collection service, one of the City's primary goals is to reduce the number of sanitary sewer overflows that occur each year. The City Council has approved budget appropriations in support of the stated goal, and the City Manager has assigned the administration, management, operations, and maintenance responsibility of the wastewater collection system to the Director of Public Utilities who serves as the department head for the City of Wilmington Public Utilities Department. Four divisions operate under the Administration of the Public Utilities Department with each having its own division superintendent and budget. These divisions include Wastewater Treatment, Utility Services, Water Treatment, and Environmental Services.

Several other City departments also assist the Public Utilities Department with various tasks required to successfully manage, operate, and maintain the wastewater collection system. These departments include City Management, Development Services, Finance, Human Resources, Information Technology, and Fleet Management.

3.2 Public Utilities Department

The City of Wilmington Public Utilities Department operates a water and sewer utility that includes water treatment, water distribution, wastewater treatment, and wastewater collection. As shown in Figure 3-1, four operational divisions operate under the Administration of the Public Utilities Department with a current staff of 177 full time equivalents (FTE) including:

- Administration (7)
- Water Treatment (26)
- Wastewater Treatment (51)
- Utility Services (67)
- Environmental Services (26)

PUBLIC UTILITIES DEPARTMENT

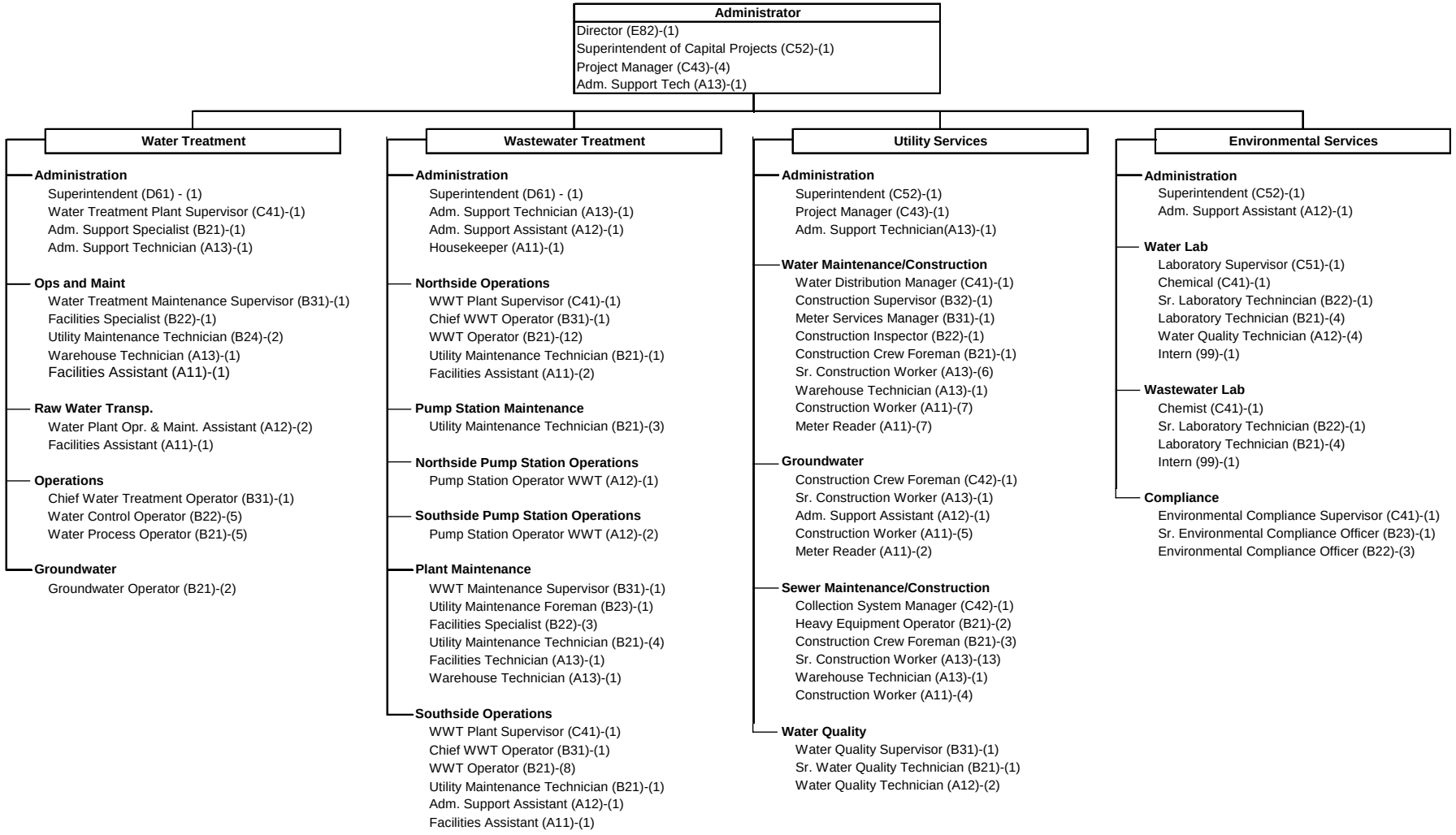


Figure 3-1
City of Wilmington Public Utilities Department
Organizational Chart
FY 2005 -2006

3.2.1 Utility Department Administration

The Utility Department Administration includes the Director of Public Utilities, Superintendent of Capital Projects, Engineering Project Managers, and Administrative Support Technicians. Many of these positions are involved in the sewer collection system management, operation, and maintenance. Capital Projects include all major collection system improvements and rehabilitation. Project Management normally oversees these capital improvement projects as well as other new construction, planning, and rehabilitation projects.

3.2.2 Water Treatment Division

The Water Treatment Division is responsible for the operations and maintenance (O&M) of a 27.5 MGD water treatment plant and all water storage facilities in the City. The water treatment plant withdraws water from the Cape Fear River above U.S. Lock & Dam #1 in Bladen County, N.C. Twenty-six people are assigned to the division.

3.2.3 Utility Services Division

The Utility Services Division is responsible for the O&M of all pipes, valves, appurtenances, and easements of the water distribution and wastewater collection system. Crews in the division complete emergency maintenance, preventive maintenance, and repairs to the systems. Most crews and resources are normally assigned to either the distribution or the collection system, but crews may be shifted from one area to the other as needed. The division has 67 employees and is managed by the Utility Services Division Superintendent who reports directly to the Director of Public Utilities.

As of February 2006, the Sewer Collection/Construction section of the Utility Services Division had 19 active employees and 5 vacancies for a total of 24 positions. The division has approximately one closed-circuit television (CCTV) crew, one heavy construction crew, one vacuum/line cleaning crew, two repair/new service connection crews, one sewer blockage response crew, and one emergency response night crew.

3.2.4 Wastewater Treatment Division

The Wastewater Treatment Division is responsible for the inspections, operations, and maintenance of the City's 30 wastewater pump stations and 2 wastewater treatment plants. The division operates independently of the Utility Services Division and is responsible for the non-pipeline portion of the collection system located inside the perimeter of their facilities. The division has 51 employees and is managed by the Wastewater Treatment Superintendent who reports directly to the Director of Public Utilities.

3.2.5 Environmental Services Division

The Environmental Services Division is responsible for performing laboratory analyses for the Water and Wastewater Treatment Division, enforcing the industrial pretreatment regulations, managing the Fats, Oils, and Grease (FOG) program, and enforcing the Cross-Connection Control Program for the water distribution system. Approximately 50 percent of the Divisions labor is allocated to the Cross-Connection Control program and the remaining 50 percent is divided between the remaining water and wastewater tasks. The division has 26 employees and is managed by the Environmental Services Superintendent who reports to the Director of Public Utilities.

3.3 Supporting Departments

As with all successful government entities, the City has a complex network of interrelated departments that function together to provide services to the public. The City of Wilmington Public Utilities Department is assisted by several other supporting departments in the City government. These departments include City Management, Development Services, Finance, Human Resources, Information Technology, and Fleet Management.

3.3.1 City Management

City Management is responsible for implementing City Council policies and overseeing all operational departments. This department also includes the City Communications Officer which serves as the liaison between all City departments and the media. This position is discussed in further detail in Section 4.9.

3.3.2 Developmental Services

The Development Services Department is comprised of the Planning, Engineering, and Traffic Engineering Divisions. The Engineering Division is directly responsible for many tasks related to the Public Utilities Department with approximately 30% of the division's annual budget coming from Public Utilities. The Engineering division of Development Services provides civil engineering and related technical services for the collection system including surveying, design, and construction administration of capital projects. These tasks are described in more detail in Section 4.10.

3.3.3 Finance

The City Finance Department focuses on the City's financial services including debt service management, cash investment, payroll, payables, billing, collections, and easement acquisition. Each of these areas impacts the City's collection system and is discussed in more detail in Section 4.3.

3.3.4 Human Resources

The Human Resources Department provides a point of contact for all City job applications and provides comprehensive services to all City departments including Public Utilities. Recruitment, classification, compensation, benefits administration,

personnel records management, training, safety and risk management, and employee relations are some of the services provided for the Public Utilities Department.

3.3.5 Information Technology

The Information Technology Department provides support for all of the individual computers, central servers, various major software applications, and network and infrastructure security for the city government. Information Technology also maintains the City's public website, internal GIS system, and departmental work order management systems.

3.3.6 Fleet Management

The City's Fleet Management Department manages, maintains, repairs, and replaces all vehicles and rolling stock used by the Public Utility Department. Fleet Management leases the vehicles to the Public Utility Department for a predetermined annual fee which includes an allotment for all maintenance on the vehicles. Fleet Management's services to the Public Utilities Department are described in detail in Section 5.7.

3.4 Organizational and Institutional Considerations for Consolidation

Sections 3.1 to 3.3 describe the organization and management of the City of Wilmington's Public Utilities Department as of June 2004. In September 2005, the City of Wilmington and New Hanover County adopted a Concurrent Resolution regarding their intent to consolidate their water and sewer utilities. At the request of the City, CDM has provided the following information that requires consideration when consolidating utilities.

The formation of a consolidated utility represents a significant step for the member entities, in merging water and sewer infrastructure to pursue new efficiencies and to be more competitive with other utility organizations in the industry.

Consolidations requires a series of milestones be achieved and the preparation of specific documents and policies. The following is a brief overview of some of those tasks and topics for further discussion between the two parties.

3.4.1 Organization and Representation

There are a number of examples of regional entities that demonstrate the variety of representation decisions that can be used to discuss viable alternatives toward a reasonable and equitable solution.

Organizational diagrams can be developed with a specific description of:

- Ownership or proportionate equity share,
- the board makeup and method and terms of appointment,

- proposed number of representatives from each jurisdiction, and
- operation and service responsibilities assigned to the regional authority.

The results of this effort will include a prioritized listing of organizational alternatives that can be presented at a workshop of stakeholders to obtain feedback on:

- the stakeholders preferences on assessing fees to each stakeholder community
- does the authority only serve as the wholesale provider of finished water and treatment of sewage flow or does it control the entire utility system within each jurisdiction
- basis for allocating costs based on some assessment measure,
- type of capabilities to be incorporated into the operational demands of a regional supply authority (ex., GIS, SCADA, CMMS),
- expectation of management capabilities needed to maintain a cohesive relationship amongst all the local entities, state and regulatory bodies,
- equity representation of each entity,

3.4.2 Interim Budget

Transition to a consolidated utility or authority may require interim funding to prepare the materials and documentation associated with a legally authorized and fully functioning organization. Funds will be needed to cover the cost of legal and technical services that will occur prior to the date of the consolidation or forming of the authority.

This includes the preparation of the various legal documents. Legal services are typically provided through the client's legal counsel who will review documents needing a test for legal standing. This work may however include consultation with bond counsel if there is outstanding debt.

3.4.3 Staffing Plan

The consolidation of existing utility organizations will have an impact on the staffing mix presently relied upon for carrying out water and sewer system services. There will probably be a centralization of various administrative services. Discussions should be held to review the benefit of retaining customer service and/or bill payment points in each community in order to provide more flexible and available contact with the public. However, the support behind the front line staff to the community could be centralized to one location in order to eliminate duplicate service elements wherever possible (i.e., billing and collections, purchasing, permitting, contract management, accounts payable, public relations and others). Even if a separate authority is formed, some services may be provided to the authority by one

or more the original utilities and paid for on a contract basis-this maybe more economical for some services like personnel and human resources than hiring separate staff for the authority.

Staffing needs for field and plant operations should be assessed based on the number of miles of mains, frequency of emergency repairs, type of maintenance strategy followed, and condition of equipment and assets. Consideration must be given to trimming staff if that is the outcome of these analyses. Will this be done over time using normal attrition or can staff be transferred into other positions?

Of particular interest should be the comparison of personnel policies that refers to the use of a compensation and classification plan within each utility. The key or critical effort will be arranging a suitable strategy for transitioning the existing employees from the current municipal and state employee programs such as health insurance and retirement. This may require research of existing employee personnel policies and benefits, state pension rules, union contract language, and other labor related issues. If employees are transferred from one organization to another what happens to these benefits and others such as accumulated vacation and sick leave which is a liability to each entity. What affect would the transition have on seniority? Employees are especially sensitive to these issues and will want definitive answers to their questions.

3.4.4 Logistics Plan

Location of administrative and maintenance offices will be a critical element in the success of a consolidation. Existing office and other space with the capacity to handle the consolidated organization should be considered as one alternative but should not be the only alternative under consideration.

The choice of location will be affected by how the organization is structured and any possible impact of future growth in the area once utilities are provided through a consolidated service district. In addition to space, other needs must be considered, such as communication equipment, reproduction equipment, office equipment and computer equipment and software.

3.4.5 Asset Transfer/Debt Management Plan

Will an inventory of assets be conducted? This will help in the consolidation of services and also in determining when assets may need to be replaced which would impact both operating and capital budget projections.

How will the transfer of assets be compensated? This analysis must take into consideration outstanding debt. Some assets may have been paid for or constructed with debt that is still outstanding.

How will the management of outstanding debt be handled? Will it be defeased and reissued by the consolidated utility? Will the debt remain in the original borrower's

hands and funded through transfers from one entity to another? Will major assets not be transferred but leased until the debt is paid off? This is the area where bond counsel in particular needs to be consulted. There are many ways to handle assets and debt that can be explored.

A policy must also be developed for treatment of other equipment that may have a shorter useful life and dollar value.

3.4.6 Operating Budget – 5 Year Financial Plan

We recommend that a five year budget schedule of operations and maintenance, debt service and capital requirements if any existing capital plans may be considered reasonable as part of the consolidation be developed. This plan needs to take into consideration what decisions were made about staffing, asset transfer and debt management made in the previous tasks. A comprehensive multi-year capital improvements program (CIP) involves detailed input and extensive discussion and review by all concerned parties. It is very important that the five year plan has a realistic approach to capital improvements including the source of funds to pay for such improvements through rates, capacity fees and/or debt.

The first year should be based on data included in the individual utility budgets for both parties, taking into consideration changes or redundancy due to consolidation. The four subsequent years should be projected based on assumptions of inflation and customer growth along with input from other assumptions as described earlier. Part of this process will be to determine obvious redundancies and possible streamlining of functions based on discussions with management and staff in the operation of each utility.

3.4.7 Fee and Rate Schedule

What affect will the consolidation have on customer rates and fees? How different is the rate structure for each utility? It is usually recommended that rates be common within a service district based on the same rate structure, i.e. base charge, volume charge and customer charge. Is the base charge for each utility-- a customer charge to fund cost of billing and etc or does it include fixed cost also? Are there different rates or surcharges for commercial and/or outside customers? Will consolidation of rates mean that some customers in either utility have a decrease in rates while others have an increase in a typical monthly bill? If the differences are significant a phase in plan may be part of a rate study, gradually bringing the rates to commonality over a period of two or three years to make it easier for customers to adjust.

It should be remembered that the rates need to support whatever capital improvements may be needed over the next few years. It may also be justified based on cost of service analysis to have rates remain different for a specified period of time due to the actual revenue requirements for each service area.

3.4.8 Standardized Utility Ordinance

The existing utility ordinances or other documents should be assessed to determine if they are current in terms of industry standards; whether they are comprehensive enough and should be amended.

It is also suggested that as part of a future long-term strategic planning effort that consideration should be given to formulating a set of rules and regulations that can be published for distribution to new customers and developers wanting to apply for water and wastewater services.

3.4.9 Transition Schedule

A schedule should be drafted for approval by both parties that will identify specific target dates for all necessary meetings and approvals to be obtained to meet the specified consolidation and identify dates for completing many of the milestones and tasks described previously in this section.

An implementation schedule should be finalized and reviewed with the working group. Amendments to the schedule should be discussed as possible changes to the schedule arise.

This is a short description of many of the tasks and steps that should be explored in forming a consolidated utility or authority.

Section 4
Evaluation of Collection System Capacity and Management

The purpose of this section is to present the findings and recommendations for the City's capacity and management practices of the wastewater collection system. The areas of interest addressed in this section include:

- Legal Authority
- Regulations and Ordinances
- Finance
- Human Resources
- Worker Health and Safety
- Information Management
- SSO Reporting
- Customer Response and Tracking
- Public Relations and Education
- Design, Permitting, & Easement Acquisition
- Facility Planning and Capacity Analysis

4.1 Legal Authority

Pursuant to § 160A-312 of the North Carolina General Statutes, the City of Wilmington has the legal authority to operate a public enterprise such as a water and sewer utility, including the wastewater collection system. In addition, § 160A-312 provides the City of Wilmington with the full authority to protect and regulate the wastewater collection system by adequate and reasonable rules.

The North Carolina General Statutes require that the rules and regulations for the wastewater collection system be adopted by ordinance, be applied to the wastewater collection system both within and outside the corporate limits of the City, and enforced with the remedies available under any provision of law.

4.2 Regulations and Ordinances

The City of Wilmington's rules and regulations for the use and protection of the wastewater collection system are presented in the City's Sewer Use Ordinance located in the City's General Ordinances as Chapter 12, Article III. The Sewer Use Ordinance sets forth uniform requirements for direct, and indirect contributors to the wastewater collection system and enables the City to comply with all applicable state and Federal laws, including the Clean Water Act (33 United States Code §1251 et seq.), the General Pretreatment Regulations (40 CFR, Part 403), and the NCDENR System-wide

Wastewater Collection System Permit. Failure to comply with these regulations could result in legal action.

4.2.1 System-wide Collection System Permit

The City of Wilmington's System-wide Collection System Permit requires that wastewater collected by the City be treated in one of the two wastewater treatment plants operated and administered by the City. Both of these plants are permitted under a National Pollution Discharge Elimination System (NPDES) permit to discharge treated wastewater into the waters of the state. Furthermore, the City's System-wide Collection System Permit requires that the collection system "be effectively managed, maintained, and operated at all times so that there is no discharge to land or surface waters, nor any contamination of groundwater."

Enforcement Actions

The City's System-Wide Wastewater Collection System Permit also provides the Director of the State of North Carolina Division of Water Quality (NCDWQ), who is the primary administrator of the permit, a means of bringing enforcement action against the City for sanitary sewer system discharges. Recent SSOs in Wilmington have heightened the State's awareness of the collection system's problems and have resulted in enforcement actions being taken against the City. The spill in July of 2005 at Hewlett's Creek Pump Station resulted in the City being fined $51,492 by the NCDWQ. This enforcement action along with the other issues surrounding SSOs in the City has given the City of Wilmington a higher profile with the NCDWQ, which could lead to continued regulatory action related to the sanitary sewer system.

4.2.2 Interconnection Agreements

Interconnection Agreements between wastewater collection systems of separate entities establish the regulations, criteria, and economic conditions for conveyance and treatment of wastewater. All interconnections between neighboring collection systems should have formally approved interconnection agreements.

The City of Wilmington has multiple interconnections with the New Hanover County's and the Town of Wrightsville Beach's wastewater collection systems. Many of these interconnections are isolated and pumped directly to the City's wastewater treatment plant (WWTP) or the Northeast Interceptor (NEI) through their own force mains. Other interconnections are sent directly to the collection system through gravity sewers. At this time, many of these interconnections are not included on the City's GIS system and are not subject to any type of formal interconnection agreement.

Interconnection Agreement Recommendations

The System-Wide Collection System Permit (SWCSP) gives the City the authority to address flows from interconnected systems that discharge to the City's collection system. It is recommended that the City implement a strategy to locate all interconnections between neighboring systems. Once located, the interconnections

should be identified and mapped in the GIS system. Specific interconnection agreements should be approved for each interconnection. Issues that should be addressed and regulated in these agreements include:

- Capacity allocation,
- Inflow and infiltration requirements,
- FOG and pretreatment program requirements,
- Flow monitoring and equipment calibration requirements,
- Operations and maintenance practices,
- Design standards,
- Administrative practices,
- Extensions, rehabilitation, and system improvements,
- System modifications, and
- Economics,

These agreements should also include applicable means and methods for the routine monitoring and evaluating of these criteria. Items included such as system modifications should require the prior approval of all parties involved in the agreements.

4.3 Finance

Pursuant to § 160A-314 of the North Carolina General Statutes, the City of Wilmington has the legal authority to establish and revise, from time to time, schedules of rates, fees, charges, and penalties for the use of, or the services furnished by, the City's water and sewer utility, including the wastewater collection system. The North Carolina General Statutes allow for the schedules of rates, fees, charges, and penalties to vary according to classes of service, and different schedules may be adopted for services provided outside the corporate limits of the City.

The Public Utilities Department is an enterprise fund within the City of Wilmington, and adheres to the principle of full cost recovery – which allows each user of the water and sewer system to contribute revenues proportional to the level of service received. The Public Utilities Department is supported by an independent schedule of rates, fees, charges, and penalties and is not subsidized by the General Fund. However, the Public Utilities Department does pay its share of overhead expenses for services provided by the General Fund for personnel, finance and budget, legal, purchasing, information technology, engineering, management, and administration.

4.3.1 Rates, Fees and Charges

The schedule of rates, fees, charges, and penalties for the Public Utilities Department are set and established by the City Council to fully recover the total direct and indirect

costs associated with providing water and sewer services including, personnel services, operating expenses, capital improvements, as well as the principal and interest on all debt issued. During the 2001 – 2002 fiscal year, a utility rate study was performed for the City of Wilmington. This study recommended and outlined a plan for steady increases in the water and sewer rates over a five year period. This plan was approved by the City Council and has since increased the sewer and water rates by a total of 20% over the past 5 years. The final increase in these rates was scheduled for the 2006–2007 fiscal year.

Sewer Base Charge
The base sanitary sewer rate for bimonthly billing for all users also receiving City of Wilmington public water is assessed at $2.47 per 100 cubic feet of metered water consumption. During the 2005–2006 fiscal year, the bimonthly sewer bill for a residential customer inside the City limits using 6000 gallons of water per month was $49.62. Customers not receiving City of Wilmington public water are required per the discretion of the Director of Public Utilities to install an approved meter on their source of water for the purpose of estimating sewer flow for the purpose of billing. These approved meters are read as part of the City's normal meter-reading schedule.

Minimum Bimonthly Sanitary Sewer Charge
The minimum bimonthly sanitary sewer charge is based on the size of the water meter serving the customer. The typical residence has a 5/8" water meter; therefore, the minimum bimonthly sewer charge for most customers is $10.00. The City's Water and Sanitary Sewer Fee Schedule is provided on Page 7 of Appendix B.

Extra Strength Sanitary Sewer Discharge Surcharges
In order to recuperate the additional costs of treating concentrated wastewater, a surcharge has been established for extra strength sanitary sewer discharges. The pollutants susceptible to this surcharge are Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Suspended Solids (SS). Concentrations exceeding established limits result in the customer being charged established rates. The established limits and surcharge rates are provided on Page 8 of Appendix B.

Water and Sewer Facility Fees
The City of Wilmington's General Ordinance, Chapter 12, Section V, provides for a category of fees known as Water and Sewer Facility Fees. The intent of these fees is to provide funds for growth-related costs incurred by the City in constructing new and expanded water and sewer capital facilities. These types of costs are necessary due to increasing population and economic development. It is also the intent of the City that the fees accurately reflect actual growth-related capital costs, and once such costs are paid, ongoing operating charges would be similar to charges imposed prior to such development.

According to the City's ordinances, the Water and Sewer Facility Fees were intended to be linked to an implementable capital improvement program to provide water and sewer facilities for which the fees are imposed. The water and sewer facility fee for

any size service is determined either by the meter size as provided in the fee schedule on Page 14 of Appendix B or by the City Manager or his designee based on the anticipated water use and sewage generation rate.

Establishing Rates, Fees, and Charges Based on Levels of Service

As the City and surrounding service areas continue to grow and its infrastructure ages, the ability of the City to meet its level of service objectives has become increasingly challenging. Fiscal conservativeness and political pressures have placed an emphasis on controlling taxes, rates, and fees; thus pressuring the city to meet increasing demands with little change in resources. The term "level of service" is used to describe the type and magnitude of beneficial results gained by the community and the environment from the city's utility programs. This level of service concept is useful for assessing the sanitary sewer system management in terms of how thoroughly and efficiently it is achieving its primary objectives. For the purposes of this discussion, different levels of service could be defined and assigned standard letter grades, with "A" being the highest and "F" being the lowest. Using Operations and Maintenance as an example, an "A" may be defined as 100 percent preventive, routine maintenance, a "B" may be defined as a Mix of Routine and Inspection Based maintenance, a "C" may be defined as primarily inspection based, a "D" may be defined as Primarily Responsive, and an "F" may be defined as Non-responsive.

Typically, a city would be evaluated both on where they are initially and where they want to be in the future. When evaluating levels of service, it is important to consider the benefits to the community and the utility customers that accompany each of these levels of service as well as the potential program costs. While there are often efficiencies that may be achieved through increased levels of service, for example cost savings from a preventive maintenance program as compared to a reactive maintenance program, it is generally assumed that increasing levels of service will be associated with higher program costs. This has been found to be true in some instances over the short term when programs are transitioning from one level of service to another, but over the long term, there are opportunities for increased efficiencies and cost savings from improved management practices and resource utilization. It is important, however, to recognize the costs needed for transitioning to a higher level of service so that changes can be made if they are desired by the community.

Rates, Fees and Charges Recommendations

1) It is recommended that the Public Utilities Department use level-of-service parameters to monitor the allocation of resources for all functions concerning wastewater collection system maintenance that support the City's SSO reduction program. It is further recommended that the Public Utilities Department use level-of-service parameters to support program and budget recommendations to the City.

2) It is recommended that the City periodically, and on a recurring basis, conduct a cost-of-service analysis of the City's schedule of rates, fees, and charges to ensure that the schedule is adequate and equitable.

3) Recognizing that existing sewers are fixed assets that require continual renewal and replacement, it is recommended that the City evaluate the funding sources for rehabilitation and replacement. The goal of this evaluation should be to ensure the adequacy of the current funding system in meeting the needs of the collection system.

4.3.2 Budget

The Public Utilities Department budget is managed consistent with the City's annual budget ordinance adopted in accordance with the provisions of the North Carolina Local Government Budget and Fiscal Control Act. As such, the City annually adopts a balanced budget for the Public Utilities Department, which demonstrates that forecasted operating revenues are equal to, or exceed, forecasted operating expenditures. The Public Utilities Department's annual budget is subject to public review and comment, prior to adoption by the City Council.

Budget accountability for the Public Utilities Department rests with the Public Utilities Director, with assistance from the Finance Director and the City Manager.

Operating Budget

The Council-approved operating budget for the Public Utilities Department is approximately $27.7 million for fiscal year 2005-2006 (excluding special appropriations) and is shown on **Table 4-1**. Of the total operating budget for fiscal year 2005-2006, approximately $3.5 million is allocated for the Utility Services Division. An allocation of $1.6 million of the Utility Services budget is for the collection system which equates to approximately 46% of the division's budget. In addition, the Wastewater Treatment Division is allocated approximately $5.4 million for the 2005-2006 fiscal year with approximately 30% or $1.6 million of the total operating budget allocated for pump station maintenance and operations.

Funds for construction, inspection, FOG control, GIS, and engineering services related to the collection system are budgeted separately under their respective departments or divisions. A non-departmental line item in the budget in **Table 4-1** is allocated for all services provided by departments and divisions not under the administration of the Public Utilities Department.

Table 4-1
City of Wilmington Fund
Budget Summary

	FY 2003-04 Actual	FY 2004-05 Adopted	FY 2004-05 Adjusted	FY 2005-06 Adopted	% Change Adjusted FY 04-05 to Adopted FY 05-06
Expenditures by Division					
Administration	381,053	439,790	450,927	363,731	
Water Treatment	4,159,889	4,603,599	4,670,724	4,644,799	
Wastewater Treatment	5,041,535	5,470,723	5,882,791	5,443,397	
Utility Services	3,227, 203	3,337,030	3,340,730	3,333,301	
Environmental Services	1,121,902	1,337,643	1,339,030	1,366,830	
Total	**13,931,582**	**15,188,785**	**15,684,202**	**15,152,058**	**-3.4%**
Expenditures by Category					
Personnel	5,055,308	5,424,291	5,419,791	5,453,610	
Benefits	1,438,900	1,613,036	1,613,036	1,612,324	
Operating	6,717,529	7,417,286	7,573,382	7,546,164	
Capital Outlay	719,845	734,172	1,077,993	539,960	
Total	**13,931,582**	**15,188,785**	**15,684,202**	**15,152,058**	**-3.4%**
Sundry					
Non-departmental	1,292,363	1,324,100	1,324,100	1,484,683	
Debt Service	6,610,171	7,834,266	7,834,266	9,657,652	
Transfer to Other Funds	310,000	1,044,000	1,044,000	1,412,600	
Total	**8,212,534**	**10,202,366**	**10,202,366**	**12,554,935**	**23.1%**
Fund Total	**22,144,116**	**25,391,151**	**25,886,568**	**27,706,993**	**7.0%**
Authorized Positions					
Administration	5	5	5	4	(1)
Water Treatment	31	30	31	31	
Wastewater Treatment	51	51	51	51	
Utility Services	51	51	51	51	
Environmental Services	19	20.5	19.5	19.5	
Total	**157**	**157.5**	**157.5**	**156.5**	**(1)**

Capital Improvements Budget

The City of Wilmington Capital Improvement Program is a critical component of the City's administration for identifying major facility needs, projecting fiscal resources, establishing priorities, and developing defined project schedules to meet the City's needs. The Capital Improvement Program spans a 5-year period and is presented in 5 categories of the City's operations. These 5 categories include:

1) Streets and Sidewalks

2) Parks and Recreation
3) Public Buildings and Facilities
4) Storm Water
5) Public Utilities

The approximate capital improvements project budget for the City for the 2005-2006 fiscal year is $43.6 million with $19.0 million allocated for Public Utilities. From the $19.0 million allocated for the Public Utilities, the collection system is budgeted to receive $2.9 million in capital improvement projects. This equates to 15.3% of the total amount budgeted for the Public Utilities Department or 6.6% of the total budgeted for the entire City. A summary of the Collection System's capital improvement projects is included in **Table 4-2**. In **Table 4-2**, the $1.9 million designated for the downtown water and sewer rehabilitation has been considered for re-appropriation to other collection system projects. The funding sources for the collection system projects are the operating budget and revenues from the sale of bonds.

Table 4-2
Summary of Collection System Capital Projects for 2005 – 2006

	Description	2005-2006
1	Downtown Water/Sewer Rehab	$1,900,000
2	Greenville Loop force Main	$65,000
3	Fence Replacement @ PS10 & PS14	$80,000
4	Pump Station Painting	$50,000
5	Pump Station 2 Improvements	$100,000
6	Pump Station Roofing	$100,000
7	Replace Pump Station 11	$615,000
8	Easement Acquisition Reserve	$100,000

Budget Recommendation

It is recommended that the Public Utilities Department budget for capital projects using level-of-service parameters to support budget recommendations to the City. Budget recommendations should be considered by the City based on the resources needed to provide the expected level of service to customers. Level of service parameters for capital improvement recommendations are used similarly to the way they are described in Section 4.3.1 under Establishing Rates, Fees, and Charges Based on Levels of Service. Examples of level of service parameters related to capital improvement budgeting include:

- What storm event frequency should the wastewater collection system convey in wet weather flows without overflows (e.g., 1-year storm, 2-year storm, 10 year storm)?

- What level of capacity assurance certification is required by the City before approving new development and connections (e.g., none; City certifies that dry-weather capacity available before approving building permits; City certifies that capacity is available during wet weather before approving building permits – this is what most SSO consent decrees require)?

- What is the timing for scheduling capital improvement needs (e.g., project complete prior to extra capacity needed; project complete within 5 years after capacity is needed; project complete within scheduled needed to not raise rates).

Ideally, these decisions are based on input from a cross-sectional representation of city customers through a series of facilitated stakeholders meetings.

4.4 Human Resources

All new, or vacant, positions within the Public Utilities Department must be advertised internally and externally to solicit candidates. This method often results in positions being filled by external candidates instead of the advancement of internal personnel.

Training

The City's Human Resources Department provides training courses for all City staff. An emphasis of this training is supervisory and management skills. The City instituted this type of training reactively due to a shortage of first line supervisors. All other training such as safety, equipment operations, etc., is the responsibility of the individual department.

Collection System Training

Training of Public Utilities Department staff is an investment that improves the knowledgebase of the department and the individual, improves morale, brings innovation to the department, and assures the Department's continued success. The Department recognizes the benefits of a well trained work force and supports operator training for wastewater collection system certification through the comprehensive state training and testing program. The training and certification unit of the North Carolina Department of Environment and Natural Resources establishes this program. To receive this training, operators typically attend the week long NCAWWA-WEA Collection System School to prepare for their examinations.

Other training resources are available to the Department through the NC Division of Water Quality's Technical Assistance and Certification Unit; through the National Association of Sewer Service Companies (NASSCO) inspection and evaluation certification program; through the National Environmental, Safety & Health Training

Association (NESHTA) recommending accredited Certified Instructional Technologist or Environmental Trainers skilled in the development and implementation of department specific operator training programs; and through regional private consultants adept at and accredited in providing specialized department specific training resources. Lastly, additional staff skills enhancements can be augmented through a series of structured but informal 30 minute tail-gate and work-bench training sessions taught by supervisory and senior personnel on topics that required routine or continued reinforcement.

Apprenticeship Program

The Human Resources Department has recently begun investigating apprenticeship programs for wastewater collection and treatment system operators. These programs allow an individual to work through an established training period with the City. Upon completion of the training period, the individual may be required to complete an obligatory period of employment. This obligation is at the sole discretion of the City. Public Utilities staff indicated that a similar program has been successful in other divisions such as Water Treatment and also in similar sized wastewater treatment and collection departments of other cities in the region.

Position Descriptions and Compensation

The City has written position descriptions and can provide position number and position description of each employee. The City's General Classification and Pay Plan is included in the City's Personnel Policy and is shown in Appendix D of this report. The current classification and salary table was implemented in 1999 as a result of a pay study performed in 1998 and is provided in **Table 4-3**. The Range column in **Table 4-3** corresponds to the classification for each employee on the Utility Department Organization Chart shown in **Figure 3-1**. The Human Resources Department plans to recommend a similar study every 8 to 10 years to ensure that the City's salary ranges and position classifications are competitive with other similar-sized cities/utilities.

Table 4-3
2005 – 2006 Classification and Salary Table

Range	Minimum Step 1	Step 2	Step 3	Market Target Step 4	Maximum
A11	$20,523	$21,201	$21,900	$22,623	$31,401
A12	$22,965	$23,723	$24,506	$25,315	$35,137
A13	$25,407	$26,246	$27,112	$28,006	$38,873
B21	$27,856	$28,776	$29,725	$30,706	$42,620
B22	$30,298	$31,298	$32,331	$33,398	$46,356
B23	$32,740	$33,820	$34,936	$36,089	$50,092
B24/B31	$35,798	$36,979	$38,199	$39,460	$54,770
B25/B32	$39,464	$40,767	$42,112	$43,502	$60,381
C41	$42,522	$43,925	$45,375	$46,872	$65,059
C42	$44,964	$46,448	$47,980	$49,564	$68,795
C43	$47,406	$48,970	$50,586	$52,255	$72,531
C51	$50,463	$52,129	$53,849	$55,626	$77,209
C52	$54,130	$55,916	$57,762	$59,668	$82,819
D61	$57,188	$59,075	$61,024	$63,038	$87,497
D63	$62,071	$64,120	$66,236	$68,421	$94,969
E82	$74,295	$76,747	$79,280	$81,896	$113,672
E83	$76,737	$79,269	$81,885	$84,588	$117,408
E92	$83,462	$86,216	$89,061	$92,000	$127,696

Human Resources Recommendations

1) It is recommended that the City continue to conduct job classification and salary studies on a periodic basis to ensure that the City continues to provide competitive benefits and wages for attracting, developing and retaining high-quality employees. As part of these surveys, the City should identify benchmark practices for implementing pay-for-performance incentives for high performing employees.

2) When establishing benefit and salary ranges, the City should consider the formal training, experience, and certifications required to fill certain postitions (i.e. wastewater and water operators). These positions are often difficult to fill and

normally require several years of experience to become functional in key roles. For these reasons, it may be more difficult to recruit potential applicants for these positions.

3) It is recommended that the City consider using an apprenticeship program to train Wastewater Treatment and Collection System Operators. While evaluating this recommendation, the City should consider an analysis of apprenticeship programs already in place in the City as well as programs used in other cities.

4.5 Worker's Health and Safety

The City of Wilmington has a City Safety Director that directs all safety programs within the government and is responsible for maintaining and enforcing all written standard operation procedures for safety. The City Safety Director represents the City in most legal claims and investigates all accidents involving city property or employees.

Along with the City Safety Director, the City has a loss prevention program and manual that is administered through the City, department, division, and section safety committees. Each division has an individual safety program managed either by a safety committee or a division safety officer. The Wastewater Treatment Division utilizes a safety committee composed of two members from each plant or section. This committee's primary task is to develop and evaluate safe work practices and environments at the wastewater treatment plants and pump stations. The committee also reviews all accidents, performs safety training, records all safety information for division employees, and appoints safety supervisors for each facility. The Utility Services Division's safety program is administered by the Division Safety Officer. This officer is responsible for reviewing all accidents, coordinating all safety training, recording all safety information, and performing safety inspections of work sites.

The City has identified traffic accidents as the largest safety issue affecting the Public Utilities Department. Accidents involving City employees are evaluated and assigned a point value. Each time an employee is involved in a traffic accident the point value is added to that employee's safety file. When predetermined amounts of points are accumulated by an employee, specific disciplinary action is taken.

The City reports that worker's compensation claims generally result from:

1) Vehicle accidents
2) Slips, trips, and falls
3) Lifting

Positions cannot be filled while a worker is out on workman's compensation. The City should either investigate claims in more detail or strive to settle claims quickly.

Worker Health and Safety Recommendations

In order to ensure workers in the Public Utilities Department are familiar with the City's safety policies and procedures, it is recommended that the Department prepare a supervisory safety manual and employee pocket safety guide. This guide should be conveniently sized to assist employees with carrying the guide daily.

It is recommended that the City organize inter-departmental training for subjects such as vehicle safety, work-zone safety, confined spaces, trenching and shoring, traffic control. These subjects are applicable to multiple departments across the City and would be more advantageous if multiple departments participated.

It is recommended that each division of the Public Utilities Department prepare standard site-safety inspection forms to document the findings of field visits. These field visits should be both scheduled and unscheduled in order to ensure that adequate safety measures are being followed and should be performed on a more frequent basis.

4.6 Information Management

Information management is a critical part of an entity's ability to manage, operate, and maintain its assets. Recognizing this need, the City of Wilmington has used various tools throughout the years to manage the information flow of the City. In recent years, the City observed the need to consolidate the various methods of information management into a single tool. Acting on this need, the City purchased and began implementation of Infor's Datastream 7i computerized maintenance management system (CMMS), a work order, information, and asset management software.

As of February 2006, the Wastewater Treatment Division and Park & Urban Forestry Service Division were using the Datastream 7i CMMS. Although both divisions were using the system, the asset databases were still being populated with information and had not fully replaced the previous systems. The Storm Water Division is scheduled to begin implementation of the Datastream 7i CMMS in the near future and Utility Services will follow. In total, 11 departments and divisions are planned to implement the CMMS including the:

- Wastewater Treatment Division
- Parks and Urban Forestry Service Divison
- Building Division
- Environmental Services Division
- Public Services Department
- Public Utilities Department
- Streets Division

- Storm Water Management
- Solid Waste Management
- Utility Service Division
- Water Treatment Division

4.6.1 Computerized Maintenance Management Systems

Computerized Maintenance Management Systems (CMMS) are widely recognized as an important element in the drive for improved public utility performance. CMMS software 'solutions' are required or desired at many utilities. Recommendations for CMMS installations or upgrades abound. Moreover, CMMS's are central to the Asset Management philosophy being espoused with increasing frequency at various public utilities. Through its proactive position in converting City Departments to a common database program from paper and other software programs (i.e., the current HTE financial and work order database), the City has demonstrated forward thinking and a desire to capture efficiencies of scale with its eventual full integration of a computerized maintenance management system.

The systems themselves are broadening their scope and functionality. System vendors have begun to refer to their software as Work Management Systems (WMS) or Asset Management solutions. Their application can reach beyond the maintenance arena; however, the City has chosen to focus their CMMS on maintenance work management at this time. The Datastream 7i product has other inherent capabilities that would permit some functionality as an asset management tool. At this particular time it is not believed that expansion into this function is necessary as the system is still in its roll-out phase.

The CMMS productivity improvement is not automatic, however. These systems are not simply 'plug and play,' requiring a commitment and the resources to fully integrate it into City Departments. The City has chosen to self-perform the process of establishing business practices by which the program will be used, conform the program to these practices and needs, populate the database, and roll it out to the different departments and divisions on a phased approach.

The CMMS systems focus on the data management capabilities of the software and permit an improvement in O&M performance and productivity. A fully integrated roll-out across department should result in broad system functionality as opposed to the limited functionality, access, and usability that the HTE and card file work order system provide. The Datastream 7i CMMS software should provide, in general:

Asset and Resource Management
The CMMS provides an organized, easily accessible library of information encompassing physical assets (including buildings, equipment and equipment components), labor resources (including employees and all relevant information such as wage rates, training and qualifications, schedules, etc), and any supporting

documentation (e.g., specifications, blueprints, schematics, material safety data sheets, safety procedures, etc).

Work Management
The CMMS automates the reporting and recording activities associated with the maintenance workflow lifecycle. Most importantly, however, the CMMS is designed to support efficient and effective maintenance practices such as the prioritizing/planning and scheduling of work, preventive and predictive maintenance practices, tracking maintenance backlog and costs, failure analysis and providing accurate work histories for repair/replace decisions. The CMMS also readily provides maintenance managers key maintenance performance metrics to help them improve equipment reliability and resource allocation.

Purchasing/Procurement and Inventory/Materials Management
The CMMS integrates purchasing/procurement and inventory/materials management with maintenance activities so that necessary parts, materials and tools are guaranteed to be available when the work is ready to be performed. This functionality also allows users to effectively track inventory, receiving and material disposition, to automatically replenish inventories and more.

Systems Integration
In addition, CMMS's provide advanced reporting capabilities and readily integrate with other management applications such as GIS (see section 4.6.2 below), SCADA, HRIS and finance/ERP systems.

Datastream 7i, successfully implemented, can help the Public Utilities Department achieve essential business outcomes by providing the individual divisions with a collaborative communication tool that:

- Supports asset management techniques.
- Supports advanced work planning and scheduling functions.
- Supports effective materials management.
- Automates the reporting/recording activities associated with the maintenance workflow.
- Provides managers and supervisors enhanced reporting and analytical capabilities for informed decision-making.

CMMS Recommendations:

1) The Datastream 7i CMMS has been partially integrated into two divisions, to date. It is recommended that the representatives of all divisions of the City re-review the business protocols, data identification protocols and integration schedule to verify that the original business objectives of the program are being achieved and determine whether those protocols need to be reevaluated. Once the business practices have been reevaluated and revised as necessary, it is recommended that

the City continue the roll-out of the CMMS to all applicable departments and divisions.

2) It is recommended that the CMMS be developed in such a way that each type of action could be recalled for a specific time period and specific location. This system could then provide specific SWCSP information by reference code. This ability would ensure that collection system data could be used for system analysis and NC DENR annual audits.

3) When defining assets in the CMMS, a unique facility ID should be assigned to each asset. The CMMS should also have the ability to interface with GIS by using a unique facility ID for each asset. This unique facility ID could then be used by GIS to track work orders by specific location or overall area such as an entire outfall line or multifamily housing development instead of just a single location.

4) It is also recommended that the City accelerate the roll-out by hiring temporary staff to help collect appropriate data (field data) and populate the CMMS for all applicable departments. Currently, it has taken approximately two years to roll-out the program to two departments; therefore, acceleration of the schedule is necessary. Once the new CMMS is fully operational, it is recommended that the City reevaluate the labor required for database management and SWCSP compliance. Along with populating the data in the CMMS, previous data stored in the HTE system should be incorporated into the Datastream CMMS.

5) It is recommended that staff workshops are provided to communicate the business plan for the use of the CMMS and how department and division personnel will be affected. Furthermore, these workshops should provide formal, structured training to all appropriate employees in the use of the Datastream 7i CMMS.

6) The GIS department should be included in the business planning re-evaluation to ensure that the CMMS will integrate seamlessly with the GIS system and the timing of the integration.

4.6.2 GIS Database for Water and Sewer Utilities

The City's System-wide Wastewater Collection System Permit, issued in 2001, indicated that the City must maintain up-to-date, accurate, and comprehensive maps of the sewer system. In addition, the permit indicated that the City must map at least 10% of the sewer system each year for a 10-year period, or until the mapping is completed. In order to comply with the System-wide Wastewater Collection System Permit, the City should have approximately 40% of the collection system mapped at this time and should be mapping at least 10% each year. The mapping information shall include:

- Pipe size

- Pipe material
- Pipe location
- Flow direction
- Approximate pipe age
- Number of active service taps
- Siphons, aerial pipes, and high priority lines
- Pump station identification, location, and pumping capacity

The City of Wilmington Information Technology Department has a geographic information system (GIS) that stores numerous data sets including streets, parcels, and other data sets important to the operation of the City. The system is operated and maintained by the GIS Section, which is under the Information Technology Department. The City's system uses the Environmental Systems Research Institute's (ESRI) suite of GIS software for data creation, storage, and analysis.

The GIS Section is responsible for the overall control of the City's GIS system. There are two staff members assigned to the section with one being the City's GIS Coordinator. The GIS Coordinator manages upgrades, provides system administration, establishes data management practices, and coordinates City GIS projects. The other member of this section assigns all 911 street addresses in the City, performs street name reviews, and provides any specialized mapping needed by the City's administration.

The City's GIS system has a revolving pool of GIS licenses including 11 ArcView licenses and 9 ArcInfo licenses. The City's GIS system is accessible to all City personnel via the City's intranet and uses a custom ArcIMS package to allow for this service. Currently, there is no provision for the public to view GIS information for the City; however, the City has discussed providing the public with this service in the future.

Three City divisions, Stormwater, Planning, and Engineering, have staffed GIS positions to create and maintain their respective GIS databases. The Engineering Division is responsible for creating and maintaining the water and sewer GIS databases.

The Engineering Division currently has one employee working to provide mapping and GIS services for the City's water and sewer facilities. This employee spends approximately 60% of his/her time maintaining the water database and 40% maintaining the sewer database. Other projects are also handled by this employee such as traffic engineering projects. This employee depends on the Engineering staff to provide the information for the GIS system. Currently, there is no established method of ensuring information is communicated from engineering, construction, or maintenance into the GIS system.

Separately from all GIS personnel previously mentioned, the Environmental Services Division of the Public Utilities Department maintains an Access database which contains sewer blockages, line cleaning, repairs, preventive maintenance items, areas videoed with CCTV, and FOG program functions. This information is used along with the City's GIS to produce maps and tables for FOG and pretreatment evaluations along with Collection System Permit audits. Information is entered into this database during the procedures shown in Section 4.8 of this report.

Other than compliance with the System-Wide Collection System Permit, GIS is useful in many areas of the wastewater collection and treatment system. The Wastewater Treatment Division uses GIS information to determine specific parcel identification numbers when assessing sewersheds, pump station basins, capacity allocation in specific areas, overloaded sections, zoning, landuse planning, I/I estimation in regards to pipe age and condition, and other valuable uses. Utility Services uses GIS during many evaluations and also for locating areas requiring maintenance and rehabilitation.

GIS Recommendations

Based on the management, operations, and maintenance of the collection system, it is recommended that the City undertake the following sewer system mapping and data management activities:

1) The System-wide Wastewater Collection System Permit issued in 2001 requires population of the sewer GIS attribute database fields to be complete by 2011; however, because of its usefulness in assessing and documenting sewer system condition, it is recommended the City populate the GIS in a more timely manner, by either:
    a) Hiring one additional qualified GIS staff member dedicated only to data conversion and field data collection, or
    b) Contracting external professional services for GIS data conversion and field data collection

    Whether additional staff is hired or external services are contracted, all GIS personnel should work closely with the recommended GPS staff member recommended for the Utility Services. This would ensure that all components of the wastewater collection system were correctly located based on GPS information.
2) In order to accurately locate and map all collection system components, it is recommended that Utility Services hire and train 1 additional staff member for the use of Global Positioning Systems (GPS). Along with hiring this staff member, Utility Services should purchase a GPS unit with sub-meter accuracy to allow for accurate field location of collection system components and interconnections. This staff member should work closely with GIS personnel to ensure that all components of the collection system are located and mapped correctly.

3) Establish a method of uniquely identifying assets through a unique ID, addressing, and accurately recording the physical location of assets added to the GIS system. At this time all City departments use a different ID or addressing system. Therefore, the GIS personnel have difficulties linking information and reconciling databases.

4) Evaluate the current GIS training program for its effectiveness and take necessary steps to provide a beneficial training program for all City users of the GIS system. If end-users found the GIS system and its information more useful, they would be increasingly dedicated to providing adequate data and information for the system. This training program should provide joint GIS training between departments/divisions and should emphasize the end-user needs of the GIS system (i.e. the Wastewater Treatment Division uses GIS for capacity allocation and planning; the Utility Services Division uses GIS for locating existing pipes and storing information related to the characteristics of these pipes.

5) Interface the new CMMS with the GIS system to provide a means for constant updates within the mapping of the collection system. Currently, DataStream does not automatically integrate with the GIS system and requires dual entry for all information.

6) Develop a method of updating the GIS system based on the mark-ups in the map books used by Utility Services' supervisors and field personnel. Cleaning, construction, and repair crews should communicate discrepancies between sewer maps and field conditions to assist in maintaining updated sewer mapping. A specific communication plan should be implemented to clarify and schedule who is responsible for communicating mapping information and who is responsible for receiving the new information and updating the GIS. To improve accuracy of the information collected in the field, the City should purchase and equip cleaning crews with hand-held GPS units.

7) Require engineers, developers and builders to provide electronic drawings for sewer system projects. Written standards for electronic submittals should include, but not be limited to, the following:

    a) A set of defined layer names that can distinguish between the types of features in the CAD file (e.g. gravity sewers on one layer, force mains on another)

    b) Color standards to distinguish the characteristics of each layer (e.g. white lines are PVC and green lines are concrete)

    c) Procedures for using external database linking techniques

    d) Procedures for creating attributed CAD files (e.g. AutoCAD Blocks insert)

4.7 SSO Reporting Procedures

The Public Utilities Department currently uses NCDENR's standardized SSO reporting form to report all SSOs occurring in the collection system. This form is provided online at the State and City websites. This form has instructions provided

for its preparation. Reporting SSOs is the responsibility of the supervising individual who responds and assesses the SSO. During the assessment of an SSO, the event is recorded as:

1) "Reportable" (defined as spills over 1,000 gallons contributing to waters of the State and the associated State reporting requirements including a press release and paid advertisement) or
2) "Non-Reportable" (defined as spills less than 1,000 gallons or not contributing to waters of the State).

SSO Reporting Recommendation

1) It is recommended that all employees in the Wastewater Treatment and Utility Services Division be trained in the proper procedures for documenting SSO events in accordance with the terms and conditions of the final System-wide Wastewater Collection System Permit.

2) It is further recommended that the procedures for handling and reporting an SSO be posted in all vehicles in the Utility Services and Wastewater Treatment Divisions. This posted procedure should include a flowchart showing every item requiring action and the responsible party for that item. A similar flowchart should be developed for City administration and their responsibilities during an SSO event. By creating these charts, every single staff member would know who was to handle each responsibility encountered during an SSO.

3) It is recommended that the Public Utilities Department designate an individual to ensure all SSOs are assessed, documented, and reported according to NCDENR requirements. The name and contact information for this individual should be included with all documented procedures for responding to SSOs.

4) It is recommended that all SSOs be recorded into a database which contains both the reportable and non-reportable events. This database should be accessible in a read-only format to all persons in the City's Administration.

5) It is recommended that the City develop a state approved digital SSO reporting form that: a) transmits an electronic copy of the form to NCDENR, b) stores the information in a database, and c)interfaces with the City's GIS system to identify maintenance and overflow trends in the system.

4.8 Customer Complaint Response and Tracking

The Utility Services Division currently has a written procedure for responding to sewer complaints. Although this procedure is typically followed, it does not specify typical items required for a formal customer complaint response and tracking process, and as a result the Public Utilities Department does not have accurate data regarding the number of complaints received, the percentage received during normal hours versus after hours, the types of complaints received, the resolution of the customer

complaint, or the number of calls that were determined to be outside the responsibilities or capabilities of the Public Utilities Department.

As found in the standard operating procedures (SOPs) for the Utility Services Division, the Procedure for Sewer Response includes the following:

1) "All calls received by telephone or radio are logged in a duplicate copy service call book with name, address, phone number, date, time and problem.
2) Calls are dispatched according to type to various trucks – sewer stops to 7011, main stops to jet vactors. Problems requiring supervisor response are dispatched to the Crew Foreman.
3) Crews resolve problems or refer them to supervision for further follow-up.
4) Crews prepare paperwork, showing problem, resolution, and other relevant information. Work orders are submitted to supervision for review and approval. Data is entered into the access tracking program set up by the Senior Environmental Compliance Officer.
5) Work orders are given to office staff for processing. Data is entered into the HTE work order system by code, costed, and closed.
6) Information is utilized for repeat problem follow-up and monthly reporting."

However, day-to-day operations by the Utility Services Division have generally followed a process similar to the following steps:

1) Customer complaints are taken by telephone. From 7:00 a.m. to 5:00 p.m. on non-holiday weekdays, complaints are taken at the Utility Services Operations Center by undesignated personnel. Although this is an undesignated responsibility, generally the complaints are taken by either the Administrative Support Technician or the Administrative Support Assistant. An answering service is responsible for complaints from 5:00 p.m. to 7:00 a.m. during weekdays, on weekends, and on holidays.

2) The person receiving the complaint logs the complaint into a telephone call report book and dispatches the complaint via the radio or cell phone to the supervisor or sewer stop truck.

3) If the sewer stop truck receives the dispatch, an immediate response is made. If a supervisor receives the dispatch, a crew is assigned to respond to the complaint.

4) The crew takes the necessary steps to resolve the complaint, fills out a work order, and reports information back to the supervisor.

5) The supervisor then places the information into a Microsoft Access database. This database is used by Environmental Services to provide required information for the collection system as described in Section 4.6.1.

6) The supervisor then delivers the paper work order to a designated place for an Administrative Support Technician in the Utility Services Division.

7) The Administrative Support Technician enters the information into the City's HTE database system and files the paper work order.

The SWCSP requires that adequate records of all complaints pertaining to the collection system be maintained. In addition, customer complaint tracking can be beneficial to assessing the condition and needs of the collection system.

Although there is not a sufficient customer complaint response and tracking process, customer calls are served on a first-come, first-served basis. As a result, wastewater collection system personnel may at times be required to cease their scheduled maintenance activities so that they can respond to customer complaints. If a complaint does not require repairs then a work order may or may not be produced. If a work order is not produced then the complaint is currently not entered into the HTE database, so not all complaints are tracked.

The HTE database is the currently used by several City departments to track work orders and financial information. The Utilities Services Division began using the HTE CMMS in 1999 and has currently logged 75,000 work orders into the system. As previously stated, work orders are logged into the HTE system by Administrative Support personnel once received from Utility Service Supervisors.

The Microsoft Access database is maintained by the Environmental Services Division and is used to provide information for the FOG and pretreatment programs as well as for System-Wide Wastewater Collection System Permit audits. Information is entered by Utility Services supervisors. From 2003 to 2005, an estimated 85% capture rate for the information needed for this database was inputted. The remaining 15% of the information is believed to be lost in transition during the complaint tracking process demonstrated above. Information from this database is also used internally by the Public Utilities Department.

The City of Wilmington has purchased and is currently implementing the DataStream 7i CMMS. This system will replace the existing HTE work order management system and is being phased into each division as time allows. Neither the DataStream nor the HTE system was designed as a complaint tracking tool and is not a sufficient substitution for this type of system.

Customer Complaints Tracking Recommendation

1) It is recommended that the City implement an system-wide customer complaint monitoring system that can be used to trend customer complaints, audit

emergency response procedures, and identify areas requiring system upgrades and process improvements. To implement this recommendation, it is recommended that the Public Utilities Department continue to work with other City departments to implement a one-call, citywide, customer complaint system that can be used to receive, process, and monitor water and sewer utility calls and inter-departmental referrals. At a minimum, the city-wide system should document the number of calls and referrals, time of call, complaint type, responsible party, response time, time spent on site, and resolution. This information can then be used to improve the efficiency of the complaints response process.

2) Until such a system is implemented, it is recommended that all City departments and division establish practices of generating work orders immediately upon receiving complaints. This ensures that all complaints are tracked and recorded in a systematic process. If complaints are dispatched via radio or cellular phone, then a work order number should be provided to the person receiving the dispatch. This number should be used on all transmittals concerning the complaint and would allow for all generated work orders to be tracked systematically. All transmittals from repair crews and supervisors should be matched to the generated work orders; therefore, assurance could be provided that all complaints received a response. If properly used, the DataStream work order system will assist in this process.

4.9 Public Relations and Public Education

The City of Wilmington utilizes several methods to provide public relations and public education. Public relations and education are generally handled either by the City Communication Officer (CCO) or the appropriate division personnel. Technical issues are normally facilitated by the CCO, but information is gathered from appropriate sources.

Public Relations

Public relations for the wastewater collection system are normally facilitated by the CCO. These relations include interactions with the general public and the press. For the general public many avenues are taken to nurture strong relationships. These include providing advanced notice of upcoming construction and road closures, notifications following SSOs, and timely notifications when utility interruptions are experienced. Methods of making public notifications include door hangers, personal visits, letters, and email.

Media relations for the collection system have normally been facilitated by the CCO. The CCO has established an effective relationship with the media by immediate notification upon evaluating SSOs, establishment of a system to provide scheduled press releases during emergencies, and being unbiased with all media organizations.

The City of Wilmington has several available avenues to provide information to the public. These include:

- The City website
- The City of Wilmington Government Access Channel on local television
- A biannual City-wide newsletter
- The City's *Annual Wastewater Report*
- The City's *Annual Drinking Water Report*

Public Education
Public education in the City is left up to the individual division. Normally, if a division has a need to educate the public, the division would notify the department director and a public education program would be established for the particular need. An example of this type of program is the public education performed by FOG personnel. This program is facilitated entirely by the Environmental Services Division.

Public Relations Recommendation

The continuing and constant challenge for all personnel involved with public relations and education is effectively communicating to customers on issues related to the need for rate increases, grease and debris disposal, private lateral maintenance, and easements access. It is recommended that the City and the Department of Public Utilities continue to allocate resources to public relations and public education programs using all available media sources to provide effective communications to customers on key issues.

In order to adequately educate the public regarding all issues surrounding the Department of Public Utilities including SSOs, it is recommended that the City designate 1 person with the responsibility of ensuring that the public is educated and informed on all major public utility events (good and bad). The goal of this individual should be to establish a formal proactive agenda on public education that creates a strong sense of ownership in the water and wastewater customers.

It is also recommended that the City convene a stakeholder's focus group consisting of representatives from a variety of water and sewer customer groups and other parties with a related interest. The purpose of the focus group would be to provide guidance to the City as to the customer's expected level of service and provide comment and input into corresponding fee level.

It is further recommended that all Public Utilities personnel receive annual training on public relations. All utility employees work for the public and therefore, should be trained to effectively communicate with the public. Because proper and correct execution of customer and public relations is one of the most critical and central tasks

that employees with the City perform, this training should emphasize treating the public as a customer. Providing this level of customer service also includes taking into account the customer's perception which can be influenced by the appearance of the work product, the personnel, and the vehicles and equipment used to perform the tasks. All public relations training should be undertaken at the departmental and division level to ensure its applicability to the staff's assigned responsibilities.

4.10 Design, Permitting, and Easement Acquisition

This section discusses additional engineering and management functions including design standards, permitting, and easement acquisition. Construction inspection is discussed in Section 5.4.

Design Standards

The City does have standard construction details and design criteria for sewers, force mains, and pump stations and a formal plan review and inspection requirement.

Design Review and Permitting

There are formal procedures for design review; however, there is no formal document describing these procedures. There are standard application forms and review checklists that the City has developed to assist with the permitting process.
In general, plans and applications are submitted to the Planning Division in the Development Services Department for review. Reviewed plans are returned to the design engineer, one or more times, as necessary, for corrections. Corrected plans are resubmitted and reviewed for final permitting. Permit letters are written by the City's Project Manager and sent to the design engineer with a copy to DENR.

In-House Design

City engineers in the Engineering Department are capable of designing sewer projects, but projects that require electrical, structural, treatment process, and control engineers are normally outsourced to private firms. Large projects that exceed about $2 million in construction cost are also normally outsourced. Whether City engineers perform the design or the design is contracted out depends on the level of expertise required and current staff workloads.

Design Standards & Design Review Recommendations

It is recommended that the City's sewer system design standards be reviewed with the personnel from the Wastewater Treatment and Utility Services Divisions to ensure that the standards, materials, and review procedures specified are satisfactory and consistent with O&M goals. For example, sewer pipe materials and associated design life and an option of using Class C-900 pipe as a standard could be discussed.

In addition, it is recommended that the standard operating procedure for conducting design reviews for projects be reevaluated. This reevaluation is to ensure that it includes at a minimum the methodology to be used in the selection of adequate

personnel for design reviews, a proposed timeframe for reviews, and a specific process for making recommendations and comments from the review.

Easement Acquisition
Easement acquisition is performed by the Purchasing Division of the City Finance Department. Assistance with all legal matters and closing is provided by the City Attorney. The City has two Property Acquisition Specialists (PAS) that follow the City's policies and procedures when acquiring property for collection system easements. The acquisition of the property includes compensating the landowner for the property. **Figure 4-4** contains the normal compensation offered by the City.

Figure 4-4
2006 Compensation for Land Acquisition

Residential	Unencumbered	$1.50/ft^2
Residential	Encumbered	$1.00/ft^2
Commercial	Unencumbered	$3.00/ft^2
Commercial	Encumbered	$2.00/ft^2

Easement Acquisition Recommendation

It is recommended that during the acquisition of permanent utility easements consideration should be given to the area needed to perform future O&M tasks. For example, it would be very difficult to repair a 30-inch gravity sewer main in a 10-foot wide permanent easement. Situations such as this example should be taken into consideration when designing and acquiring easements.

It is recommended that the City reevaluate the levels of compensation offered for land acquisition. Land prices in the City of Wilmington have risen significantly over recent years and these levels may not be adequate when compared to the actual market value.

It is also recommended that the City increase the amount of public education relating to utility easements in areas of planned construction. Educational activities should be coordinated with the City Communications Officer and the Department of Public Utilities staff member assigned to public education as recommended in Section 4.9 of this report.

4.11 Facility Planning and Capacity Analysis

Capacity analysis and facility planning are important components of a wastewater collection system. Capacity analysis determines the volume of wastewater being conveyed by each portion of the collection system. This data is normally compiled for

both wet and dry weather periods and provides the City with areas that are at or near maximum hydraulic capacity. Maximum hydraulic capacity is the amount of wastewater that can pass through the any portions of the wastewater system without causing damage to the system or an SSO. Facility planning ensures that land use and development are monitored to ensure that the collection system is not over allocated. Items that assist with these components of the wastewater system are master planning, flow monitoring, system modeling, I/I analyses, capacity allocation plans, and sewer condition assessments.

The City of Wilmington currently has very little information regarding the capacity and facility planning of the existing collection system. The information available includes a Wastewater Master Plan that was completed in 2001, with an update to the Wastewater Master Plan in 2005; however, this Master Plan was focused on the wastewater treatment plants and to some extent on the pump stations. The collection system received much less focus during this Master Plan. There is some flow monitoring information at large pump stations and at the wastewater treatment plants, and a capacity analysis of the major interceptor along the downtown waterfront was conducted in 2002 as part of the Downtown Sewer Infrastructure Study. This analysis included flow monitoring and future flow projections but was limited to the downtown area generally bounded from Ann Street to Cowan Street and from the Cape Fear River to Fifth Street. An in-depth analysis of the Northeast Interceptor including a capacity analysis is being performed. A Sewer Condition Assessment for the rest of the collection system is also currently being performed; however, this Sewer Condition Assessment does not include a capacity analysis.

Capacity Analysis and Facility Planning Recommendations

It is recommended that the City commission a comprehensive system capacity analysis. The objective of the analysis will be to define areas of the system that are receiving excessive infiltration and inflow volumes, areas of the system that appear to be at-risk for capacity-related sewer overflows, and sewer segments that appear to have insufficient hydraulic capacity to convey system flows.

The first step of the system capacity analysis would be the installation of flow monitors at strategic locations within the system, preferably at the outfall of key sub-basins. These flow monitors would provide baseline wet and dry weather flow data that would be used with hydraulic modeling to identify areas with insufficient hydraulic capacity that appear to be susceptible to surcharging and overflow events.

The second step of the system capacity analysis would be to develop a hydraulic model to cover all trunk sewers, major interceptors, and major pump stations in the entire system. By constructing the sewer hydraulic model and using the results from the flow monitoring program, the Public Utilities Department will have an accurate assessment of the existing hydraulic capacity of the system and begin to define priorities for capacity improvement or infiltration and inflow reduction.

It is recommended that the City use information resulting from the capacity analysis along with the Sewer Condition Assessment Framework, to prepare a comprehensive collection system Master Plan and Capital Improvements Plan. Any of these plans should be dynamic in their nature to allow for continuous updates by the City staff.

It is recommended that the City utilize temporary flow monitors to prioritize sub-basins for I/I reduction through sewer rehabilitation. Temporary flow monitoring in the downtown study mentioned above was performed and as a result, Sewershed 3 in the Pump Station No. 9 sewershed was prioritized for rehabilitation. A wide-spread temporary flow monitoring program will allow the City to better prioritize improvements and make more informed decisions related to infiltration/inflow. This data can also be used to calibrate a system model.

It is recommended that the City develop a Capacity Allocation Plan. This plan would allow the City to determine whether available capacity exists when requests for development review or building permits are made. This plan would also allow the City to allocate predetermined amounts of collection system capacity to specific industries and developments. By integrating this plan into the development review and building permit process, collection system capacity could be better assessed prior to approval. In addition, requests to add flows from satellite systems (such as areas of New Hanover County) could be better assessed.

CDM assisted the Knoxville Utilities Board (KUB) in developing a capacity allocation plan that could serve as a template or a starting point for the City of Wilmington. KUB's capacity allocation plan is based on a Consent Agreement requiring a professional engineer to stamp all building permits verifying there is capacity in the collection system for the projected additional flow. Several procedures were established for this purpose. The first procedure relates to development review. Developments are not approved unless they reserve capacity in KUB's collection system. This can be done by first paying a fee (currently $300) for KUB to check capacity and then if approved, by signing a capacity reservation agreement and giving KUB a deposit (currently in the amount of $600 per unit for residential developments). The deposit will be forfeit unless the developer submits formal plans and executes an extension agreement within 1 year. During the term of the extension agreement, the deposit will be refunded annually based on the number of connections made. In addition to the City of Knoxville, KUB serves portions of the County, and County building permits and developments are sent to KUB for approval, as well.

An information management system was developed by CDM for KUB to check and manage development review and building permit review. The GIS-based program allows users to develop scenarios with assumed or probable increases in the flow to the system and determine how the proposed building or development will impact capacity. When capacity is not available, the system helps the user determine how credits could be applied in lieu of existing capacity.

It is recommended that the City begin tracking additional performance measures. Performance measures currently included in the Public Utilities Department's FY 2005–2006 Strategic Business Plan are the number of miles in the system to be cleaned each year, the number of miles actually cleaned each year, the cost per mile of pipe to be cleaned per year, and the number of stops per mile each year. Additional performance measures are discussed in Section 6 and include parameters such as "budget/mile of system", "staff/mile of system", "budget/lift station", etc, As the City continues to grow, these parameters provide support when requesting additional resources for the Collection System.

Section 5
Evaluation of Collection System Operations and Maintenance

The purpose of this section is to present the findings and recommendations of the Sewer Condition Assessment for the City's O&M practices for the wastewater collection system. The areas of interest addressed in this section include:

- Emergency Response & Corrective Maintenance
- Preventive Maintenance (Easements, Cleaning, Inspection, Root Control, and Corrosion and Odor Control)
- Sewer Rehabilitation
- New Construction
- Pump Stations
- Pretreatment
- FOG Control
- Equipment Management and Fleet Management

5.1 Emergency Response and Corrective Maintenance

Crews from the Utility Services and Wastewater Treatment Divisions of the Public Utilities Department provide emergency response and corrective maintenance to the City's sewer system. The Wastewater Treatment Division is tasked with all emergency response and corrective maintenance of the pump stations and wastewater treatment plants. Section 5.5 includes all information regarding emergency response, corrective maintenance, and preventive maintenance of the pump stations. Utility Services is tasked with all emergency response and corrective maintenance of gravity lines, force mains, manholes, and service laterals.

Utility Services normally initiates all response to customer complaints and other emergency situations. The City has two written procedures that assist in emergency responses to sewer system discharges. The Sewer Spill Response Plan provides a procedure for responding to and reporting SSOs, and the Utility Services Division's Standard Operating Procedure #21 provides a procedure for responding to emergency sewer stops. Utility Services has crews capable of responding to any number of sewer system emergencies, including line blockages resulting in either overflows or backups at service laterals.

The Utility Services Division has 19 personnel designated for collection system repairs and maintenance. Included in these personnel, 3 persons are assigned to the division's sewer stop truck and respond immediately to all customer complaints potentially caused by sewer blockages. One of these three persons is assigned for the day shift and the other 2 persons are assigned for night and weekend emergency

responses. Along with these three persons, supervisors and all other collection system staff are available to assist in emergency responses. The one sewer stop truck is a high pressure-low volume hydraulic "rodding" truck, which is equipped to relieve blockages in service laterals and short sections of gravity sewer mains.

Other than the sewer stop crews, Utility Services has other resources available for emergency response and corrective maintenance. These resources include heavy construction equipment and operators, two repair crews, a CCTV crew, and two jet/vacuum trucks and operators. Contractors are also available for emergency response and can be dispatched directly by the supervisors.

Scheduling of the crews is based on complaints from customers. Crews respond by locating the blockage. If the blockage is in City-owned sewer, the crews work to clean the line and remove the blockage. If the blockage is not in the City-owned sewer, the customer is notified to contact a plumber to clear the blockage. A reoccurring problem is that plumbers push blockages past the customer/city maintenance boundary resulting in a revisit by Utility Services for additional line cleaning and flushing.

According to the Access database maintained by the supervisors and discussed in Section 4.6, the Utilities Services Division responded to approximately 15 main blockages per month and 50 sewer stops per month during the 2004–2005 fiscal year. Most of the sewer stops and blockages located in service laterals were cleared by the sewer stop truck, but some require a jet/vacuum truck to clear. All main blockages were cleared with a jet/vacuum truck.

Each main blockage or sewer stop response is noted in a crew daily work report and generates a work order for the HTE system, as discussed in Section 4.6. The information is also entered into the Access database. Environmental Services is currently using the Access database information to target areas that have required multiple responses.

Table 5-1 demonstrates a breakdown of all Utility Service crews that are available to make emergency responses and corrective maintenance.

Table 5-1
Utility Service Division's Collection Crew

Type	# of Crews	Persons/Crew	Trucks
Supervisors/Management	3	1	3
Heavy Equipment	1	4	1
Construction/Repair	2	3	2
CCTV	1	1	1
Vacuum/Line Cleaning	1	2	2
Sewer Stops	2	Day: 1 Night: 2	1

Emergency Response and Corrective Maintenance Recommendations

It is recommended that the City begin a systematic approach to providing the necessary equipment to respond to and repair collection system problems. This approach should also include provisions for redundancy in frontline equipment. Redundancy in City-owned equipment would allow for decreased cost associated with contractor fees and lost time due to lack of equipment.

It is recommended that the City increase sewer stop capabilities by taking several actions.

1) Increase the daytime sewer stop crew size by 1 person. During the daytime, there is only one staff member assigned to the truck. This is not efficient and in some cases presents safety concerns as the truck requires a significant level of concentration to operate. Due to the truck operating in public right of ways, traffic control is nearly impossible with a single man crew. This additional staff member would reduce the number of times that other crews and supervisors were required to assist the sewer stop crew and greatly increase the efficiency of sewer cleaning operations.

2) Provide an additional sewer stop truck. This second truck would benefit the City in three ways. First, the second truck would provide redundancy in the event that one truck was out of service. Second, there would be a second truck available during times when simultaneous responses were required. Third, it would permit preventive maintenance flushing of problem areas when sewer stop calls diminish.

3) Provide CCTV capabilities as standard equipment on the sewer stop truck. This would allow for decreased labor and equipment costs for a CCTV truck to visit the site, and it would allow the sewer stop crews to visually verify all line clearing activities. All video should be written to a digital format to insure that a record of all applicable maintenance activities is assigned to the address.

It is recommended that CCTV be used to digitally video all collection system gravity lines after cleaning has been performed. These digital videos should have a designated person(s) for review. Once reviewed, all needed corrective action should be recorded and work orders should be generated for the actions required. The digital videos should be archived and made accessible from the City's GIS.

As discussed in Section 4.6, it is recommended that the City's GIS and work order database be used to document and map all customer complaints and corrective action taken on the collection system. Feedback should be provided to Utility Services crews and supervisors. This feedback should assist in identifying reoccurring problems and be used to develop routine maintenance schedules.

5.2 Preventive Maintenance

Although preventive maintenance of the collection system, excluding the pump stations, is tasked to the Utility Services Division, the available crews spend nearly all of the time performing emergency or corrective maintenance. Some preventive maintenance is performed during times when requests for emergency maintenance are low. Depending on staffing levels, one or more people will perform preventive maintenance in locations identified as problem areas. However, in general, little preventive maintenance is performed, and there are no staff dedicated to preventive maintenance. There are few written standard O&M procedures (SOPs, SMPs) for preventive maintenance tasks. Tracking and documentation of activities is through written daily reports from crew members and supervisors.

Preventive maintenance issues discussed in this section include easements, sewer line cleaning, smoke testing, closed-circuit television inspection (CCTV), manhole inspection, root control, odor and corrosion control, and force mains.

General Preventive Maintenance Recommendations

Obtain resources for dedicated preventive maintenance of the collection system. Currently less than 5% of resources are used for preventive maintenance and over 95% for corrective maintenance. A long-term goal should be to approach 80% preventive maintenance and 20% corrective maintenance. "Experience in both the public and private sector has shown that as more resources are dedicated to preventive maintenance, fewer resources are needed for corrective or emergency maintenance, and total maintenance costs begin to decline." (WEF 1992)

5.2.1 Easements

The City's sanitary sewer system is located on both public and private property. The portions located on public property include facilities located in street and road right-of-ways while the portions located on private property require recorded easements or rights-of-way for City access. An estimated 7% or 28 miles of the City's sanitary sewer system is in inaccessible easements. Many are overgrown and access to some sewer easements is restricted due to the 'marshy' conditions of the easement. Therefore, many of these sewers are inaccessible with normal collection system maintenance equipment. These conditions restrict the City from gaining access to the easement in the event of an emergency repair and/or response to an SSO. Sewer access is a major requirement of the City's Collection System Permit which indicates that right-of-ways shall be properly maintained to allow accessibility to the wastewater collection system.

Currently, Utility Services has designated a crew of 4 persons to serve as both the heavy equipment construction crew and the easement crew. This crew is responsible for inspecting and maintaining all collection system easements as well as performing all major collection system repairs that require the use of heavy equipment. A program of routine monthly inspections of previously cleared and accessible easements and manholes are performed with each manhole being opened and

visually inspected during this procedure. Observations and information is recorded in log books and is stored by the crew foreman.

The easement crew is also tasked to clear and create access to easements that are not accessible. Many of these areas are located in marshy areas and are inaccessible without the use of mats. This crew has not cleared or created new access to any easements in over one year due to continued maintenance of accessible easements and other system repairs requiring heavy equipment.

Easement Recommendations

The City should initiate a program to secure the needed resources to safely clear the heavy vegetation from these easements. This program should include at minimum the identification, location, and mapping of all densely vegetated or inaccessible easements, a designated crew and needed equipment to access and clear the identified easements, a proposed schedule of initial and continued maintenance of these easements, implementation of the Datastream work order system to record and schedule the maintenance of these easements, and a formal process to integrate easement and access inspection findings into a retrievable document storage repository.

It is also recommended that the City obtain additional resources to clear, inspect, and maintain easements. One option for additional resources is to contract out the initial clearing. Then, a designated City easement crew would need to be hired and adequate mowing equipment purchased to maintain and inspect the easements once they have been cleared.

It is recommended that the City develop a method of accessing marshy areas to inspect and maintain easements. This might include such equipment as additional mats for supporting tracked equipment; amphibious, all-terrain vehicles manufactured similar to "Argo" amphibious vehicles; and other equipment intended for these purposes.

The City should also develop an easement inspection and maintenance plan. Include SOPs, SMPs, and training for easement clearing, mapping, tracking, etc. Document easement clearing efforts in a database and update GIS system to flag sewers that are located in easements.

5.2.2 Cleaning

Maintaining a clean and fully open sewer is a main component of a preventive maintenance program. Sewer cleaning can be an effective method for FOG control which is an issue in many parts of the City's collection system. Cleaning will also control roots, sand, grit, and odors, and combined with CCTV will provide valuable system inspection to locate potential problems.

The Utility Services Division has two combination jet/vacuum trucks. These trucks are high pressure jet cleaning trucks with a vacuum system and holding tank to

remove debris and grit from the line. By using this type of truck to clean sewer lines, the grit and debris are captured instead of pushing it downstream to other lines or the wastewater treatment plant. Additionally, these trucks are also equipped with root cutting equipment to assist in removing roots that cause sewer blockages. At this time, the division only has one crew designated to the operation of the combination jet/vacuum trucks so sewer blockages requiring extensive cleaning efforts by the combination jet/vacuum trucks delay routine and scheduled line cleaning in the system.

Collection system line cleaning has been performed routinely for the past several years according to Utility Services personnel. In 2005, 48 miles of gravity sewer mains were cleaned by the division which equates to approximately 13% of the systems total miles. Line cleaning is scheduled and recorded by the division supervisors who use grids of the city to accomplish this task. Location and lineal footages are recorded during cleaning, and CCTV is used to video the lines after cleaning.

The line cleaning crew has access to two separate combination jet/vacuum trucks but oftentimes is unable to meet the cleaning schedule. Although there are two combination jet/vacuum trucks, these trucks often are out-of-service and require lengthy amounts of time at fleet management for repairs. Scheduled line cleaning is also interrupted frequently to assist in relieving main blockages in other areas of the city.

Sewer Cleaning Recommendations

1) Implement a crew solely dedicated to scheduled preventive maintenance cleaning. This crew should include two personnel to ensure that worker and motorist safety is maintained. Much higher rates of cleaning and efficiencies can be obtained from dedicated crews.

2) Provide, at minimum, a second line cleaning crew. This crew would be scheduled for preventive maintenance cleaning but would be available for stoppages when needed.

3) Provide two new combination jet/vacuum trucks to replace the existing line cleaning trucks. The existing trucks have repeatedly been out of service and are not suitable for daily use according to Utility Services' staff. Newer equipment requires less corrective maintenance and increases production rates. Consideration should be made to retain one of the current trucks for use as a back-up.

4) Although the Collection System Permit does not state the required 10% cleaning per year is for previously uncleaned sewers, a good practice for optimal collection system performance is to develop a cleaning plan that includes cleaning at least 10% of the system each year that has not been previously cleaned. Cleaning above and beyond this 10% level would be for lines which require more frequent cleaning. This plan should include documentation and record keeping of areas

cleaned and efficiency of cleaning operation. This information should be mapped on GIS and be automatically assigned by the new Datastream work order system. The overall goal of this plan should be for all sewers to be cleaned once every 10 years with the expectation that some sewers will require routine cleaning on a more frequent basis.

5.2.3 Inspection

Field inspections are an important part of a preventive maintenance program and are used to identify sources of infiltration and other defects. A simple type of inspection is just general observation of the system (i.e. walking the sewer lines). The City's Collection System Permit states that the City shall inspect the wastewater collection system regularly to prevent malfunctions and deteriorations, operator errors, and discharges that may cause the release of wastes to the environment, a threat to human health, or a nuisance. The inspections would include documentation containing:

- Date and time of inspection
- Observations made
- Maintenance, repairs, or corrective actions needed

Currently, these general field inspections are performed by the easement and heavy equipment crew. Although this crew has worked diligently to meet the required permit conditions, corrective maintenance occupies much of their available time. These tasks should be performed by the recommended dedicated easement crew described in Section 5.2.1.

Inspections of the collection system may also include smoke testing, closed-circuit television inspection (CCTV), and manhole inspections as discussed below.

Smoke Testing

Smoke testing can be a beneficial tool for locating problems for repair and inflow sources. Broken caps, missing caps, and even gutters draining into the cleanouts can all be discovered during smoke tests. Smoke testing can also provide information on other potential sources of infiltration/inflow (I/I) such as roof drains, area drains, and storm sewer connections.

The City does not currently perform smoke testing as part of a preventive maintenance program. An inflow and infiltration study was performed in the mid 1990s. During this study, the City performed smoke testing in all areas except the downtown area. City staff reported that many areas were found to have major inflow and infiltration problems and action was taken to correct these problems; however, these actions were not documented.

Closed-circuit Television Inspection (CCTV)

The City has one CCTV camera system. The CCTV truck normally videos lines after cleaning has been performed. The CCTV truck is staffed by one person but is assisted by sewer stop truck personnel or a supervisor. CCTV is mostly used in problem areas

of the city, and if a problem is determined to be due a customer's actions, the situation is reported to the Environmental Services Division. The CCTV system has a reach of 1000 linear feet.

Manhole Inspection
Routine manhole inspections are handled by the heavy construction and easement crew. All accessible manholes in easement are visually inspected routinely. Easement crews will note evidence of corrosion, evidence of surcharge or infiltration, and other defects such as broken rims or lids during their normal course of work. This information is recorded in the easement crew log books, written up on a daily work log as shown in Appendix F, and is provided to Utility Services Division Supervisors for further corrective action. The Supervisors ensure that work orders are generated and these tasks are scheduled for repair.

Inspection Recommendations

1) The City should integrate the manhole inspections into the GIS and Datastream system to ensure that all manhole inspections are documented electronically and problem areas identified.
2) The City should consider pursuing a smoke testing program. The program could consist of a two-person smoke testing crew. Areas for smoke testing could be prioritized based on potential for inflow and infiltration reduction. Flow monitoring and modeling results could be especially helpful with this effort. Potential inflow sources and illegal connections on private property could be documented, and passed along for repair and/or code enforcement.
3) Implement a uniform procedure for CCTV inspection and interpretation, especially concerning how to document condition of pipelines and procedures for documenting, tracking, and recording both the information on where and when CCTV has been performed as well as documenting the condition of the sewers inspected. It is suggested that inspection and repair guidelines be used similar to the standards developed by the National Association of Sewer Services Companies (NASSCO).
4) Perform manhole inspection as part of a rehabilitation program (discussed in Section 5.3).

5.2.4 Root Control

Although the City has an existing root control program, roots are a known problem especially in easements. Although cleaning and rodding can remove roots, vegetation removal and clearing accompanied by chemical treatment provides the best long term root control solution with up to three years between applications.

The Utility Services, Wastewater Treatment, and Environmental Services Divisions have previously discussed the topic of chemical root control (CRC) in the City's collection system. Following these previous discussions, the Environmental Services Division undertook a study to determine which chemicals could be used and the effects on the wastewater treatment plants. Although the Environmental Services

Division's study identified a safe chemical, CRC has only been performed on a limited and monitored basis. Recently, no CRC has been performed by the Utility Services Division.

Root Control Recommendations

1) Building on the previous study, the City should include a list of effective and suitable chemicals that can be used to successfully control root and vegetative growth in the collection system to its current root control program. In addition to supplying this list, the following information should be determined and included in the root control program:

    - The short and long term benefits of using each recommended chemical,
    - The costs of providing scheduled CRC in comparison to scheduled mechanical root and vegetation removal for each type of chemical,
    - The short and long term impacts on the biological processes of the wastewater treatment plant for each type of chemical, and
    - The effectiveness of chemicals used by other collection systems in regions with similar native vegetation.

2) Upon listing suitable and effective chemicals in the City's root control program, areas of the collection system with known root related problems should be prioritized, and CRC should be performed for these areas. The treated areas should be tracked by GIS/Datastream to determine the short and long term effectiveness of the root control program.

5.2.5 Corrosion and Odor Control

The City has hydrogen sulfide problems and odor control issues, most often associated with the system's pump stations and force mains. The Public Utilities Department has an Odor & Corrosion Control Program (OCCP) comprised of a team of operators, mechanics, and engineers that meet monthly to discuss these issues. Currently the odor control issues are addressed by odor control systems located at pump stations. The odor control systems rely primarily on chemical oxidation of the hydrogen sulfide to remove the problem compound. A local contractor is utilized for the maintenance of these odor control systems, and the OCCP team has experienced no recent odor complaints.

Utility Services personnel stated that several sections of force mains and gravity sewers have severe external corrosion that have the potential to cause major problems. For example, the 20" discharge from Pump Station #12 has significant exterior corrosion and was stated to be a critical area for needed sewer rehabilitation.

Corrosion Control Recommendations

The City should perform a corrosion survey to determine the amount of corrosion present before it causes severe problems. An inspection for evidence of corrosion

should be performed at areas of the system most likely affected such as Pump Stations, areas of high turbulence, force main discharges, transition manholes, ARV manholes, and junction chambers. Also, known areas of external corrosion should be evaluated to determine the extent of structural damage to the pipe network.

5.2.6 Force Mains and Air Release Valves

At this time, the City performs no preventive maintenance on force mains and air release valves. Additionally, these are not inspected unless there is a problem reported. Under the current organization, Utility Services would provide inspection and maintenance on force mains and air release valves, but has no designated personnel to perform this preventive maintenance.

Force Mains and Air Release Valves Recommendation

It is recommended that the City develop a plan (SOPs/SMPs) for Utility Services to perform preventive maintenance on force mains and air release valves. This plan should include at a minimum a schedule to locate, inspect, and map in GIS all force main routes and air/vacuum valves on the collection system. Additionally, this plan should include the implementation of an air/vacuum valve maintenance program that includes designated Utility Services' personnel responsible for the performing the preventive maintenance. This maintenance program should be included in the work order system, and the system should automatically generate work orders for scheduled maintenance and inspection of these force mains and valves. Standard preventive maintenance for air release valves includes quarterly checks and an annual cleanout of the valves. Procedures and practices for force main inspection are being further addressed as part of the Sanitary Sewer Condition Assessment Project.

It is further recommended that force main design be improved to reduce the total number of air release valves required. This would require forcemains to be constructed with less fluctuations in elevation. Also, the installation of air release valves should require the insertion of a T-fitting into the forcemain instead of using a tapping saddle. Stainless or plastic air release valves should also be required to reduce internal corrosion of the valves.

5.3 Sewer Rehabilitation

The City's Water and Sewer Rehabilitation Team evaluates and identifies capital improvement projects in the collection system and makes recommendations to the City for rehabilitation projects. Currently, the City only performs a limited amount of sewer rehabilitation. The majority of the rehabilitation work is in response to emergency point repairs and includes cured-in-place lining and open-cut replacement. Manhole rehabilitation typically includes repair of severe structural defects and/or safety problems. Most manhole rehabilitation performed is straight replacement of corroded manholes. Little to no manhole lining has been performed.

Sewer Rehabilitation Recommendations

1) The City should increase sewer rehabilitation efforts to at least 1-2% per year. This recommendation is based on the fact that the longevity of the sewer is on average 50-100 years, so at the rate of 1-2% per year, the entire sewer system could be rehabilitated in 50-100 years. This level of rehabilitation is required to restore infrastructure integrity in a timely manner and will also result in reduced maintenance costs and improved system performance. This will reduce stoppages and overflows and also reduce I/I, thus freeing available capacity of the existing system. With a total length of approximately 370 miles, 1% would be approximately 3.70 miles of rehabilitation per year. Assuming a cost of around $125 per foot to rehabilitate, this would mean an annual rehabilitation program of $2.44 million per year.

2) In addition, the sewer rehabilitation budget and work performed should be divided between two parallel programs based on the goal of the rehabilitation: Structural and maintenance driven rehabilitation and comprehensive rehabilitation for I/I reduction.

The objective of a structural and maintenance driven rehabilitation program should be to identify projects that reduce actual operations and maintenance costs associated with repeat service calls, as well as projects that reduce predicted service disruptions and capital costs resulting from catastrophic failures. Work order history data as well as physical attributes and condition information are valuable in prioritizing projects under this program.

The objective of the I/I reduction rehabilitation program is to reduce I/I in the system and increase system capacity. In addition to structural and maintenance based rehabilitation, it is recommended that the City perform sewer rehabilitation focused on I/I reduction which would mean comprehensive rehabilitation of key sub-basins. Flow monitoring data (recommended in Section 4.11) can be used to prioritize key sub-basins. It is also important to provide a physical means of effective comparison when performing I/I reduction to ensure that the rehabilitation is actually reducing I/I.

Table 5-2 presents an outline of a proposed program including the primary approach, documentation, construction approach, and suggested funding level for each of three main goals of the proposed program: capacity recovery (I/I reduction), damage repair, and maintenance reduction.

Table 5-2
Outline of Proposed Annual Sewer Rehabilitation Program

Goal:	Capacity Recovery (I/I Reduction)	Damage Repair	Maintenance Reduction
Primary Approach	Comprehensive	Point Repairs	Reach-By-Reach
Documentation	Pre & Post Monitoring	Datastream	Datastream
Construction Approach	Traditional Bid	In-House	Retainer Contracts
Minimum Suggested Funding Level	At least 0.5% of system/year	One Crew	0.5% of system/year

5.4 New Construction

The Public Utilities and the City Engineering Division perform plan review, plan approval, permitting, and inspection for new construction in the City. The divisions are responsible for developer related projects, CIP projects, and system upgrades including sewer line extensions. There are a total of 6 construction inspectors in the Engineering Division. Three of these persons inspect capital improvement projects and 3 inspect private development. Construction services are normally contracted to an engineering firm for capital projects. The Director of Public Utilities works with Engineering to determine which capital projects have contracted inspectors and which have City inspectors based on expertise and workload.

According to Engineering Division personnel, full time inspections are performed on all collection system projects. New development has scheduled and unscheduled inspections at least once per day as determined by the inspectors. However, developers must have a Professional Engineer seal all required as-built construction documents. All as-built drawings for collection system projects and new development are now being scanned in .tiff file format using a Laserfish program to electronically index the drawings.

The Engineering Division has written technical standards for all construction and design projects. As part of these standards, as-built drawings with a Professional Land Surveyor's seal are required for each project. CCTV is also required by these standards for all new pipe construction, and City inspectors are required to be present for this videoing during capital improvement projects.

The City's standards require a one-year warranty for all new collection system construction. Although this warranty is required, responsibility lies upon the City's project manager to ensure that a one-year warranty inspection is performed. Capital improvement projects require a thorough acceptance process, but even with this

process, the project is often closed out prior to the one-year inspection being performed.

New Construction Recommendations

1) The City should take necessary actions to ensure that the one-year warranty inspections are completed. These inspections should be scheduled immediately upon the date of substantial completion of all projects. All defective work found during these inspections should be recorded in detail and the contractor should be notified in a timely matter concerning the defective work.

2) Additional standards should be developed to address the workmanship of contractors and sub-contractors on capital projects. An example of this type of standard would be the development of a standard to address the low pressure air testing of gravity sewers to ensure that exfiltration as well as infiltration is minimized for new construction. This type of standard would need to be very precise in its methodology and should require the worst case scenarios to be applied during the tests.

3) Along with addressing City-funded projects, the City should develop a policy approach to addressing private side infiltration and inflow that consists of the following at a minimum:

   - The City Sewer Use Ordinance should include language that makes the introduction of non-wastewater related flows (e.g., stormwater, groundwater) illegal with potential enforcement actions by the city including fines and/or discontinuation of service
   - The City should employ code enforcement personnel who have the responsibility of enforcing against this and other water and wastewater codes.
   - Under the proposed sewer system smoke testing program, infiltration and inflow sources located on private property (e.g. defective or broken service clean-outs) should be identified and recorded.
   - Property owners should be notified of violations and given a eriod of time to correct the deficiency.

In areas where private side inflow and infiltration is suspected of causing downstream capacity problems during wet weather, a more aggressive approach may be warranted.

5.5 Pump Stations

The City of Wilmington collection system has 30 pump stations. Each of the 30 pump stations are equipped with SCADA telemetry which is monitored 24 hours per day, 7 days per week at the Southside WWTP. Twenty-three of the pump stations have on-site, diesel generators for back-up electrical power. The other 7 pump stations have

designated mobile generators which are stored at the Northside WWTP. All generators are load tested weekly.

The pump stations are maintained by the Wastewater Treatment Division. There are three full-time staff dedicated to pump station maintenance. These staff members include three pump station maintenance mechanics. The division also has three electricians dedicated to the 30 pump stations on the City's collection system and the two wastewater treatment plants. Each maintenance mechanic and each electrician are assigned to approximately 10 pump stations. Each pump station is also visited daily by one of three certified collection system operator who ensures that the station is functioning properly, and routine visits are made by maintenance mechanics and electricians. Each of these visits is recorded in the pump station's log located at the station. Maintenance mechanics and electricians rotate being on-call for nights and weekends. One maintenance mechanic and one electrician are on-call simultaneously. The maintenance mechanics and electricians are each assigned a designated utility truck equipped with all needed tools to make necessary repairs to the Pump Stations. If additional assistance is needed, WWTP maintenance personnel or Utility Services personnel are contacted for assistance.

Also working to ensure successful operations of the pump stations is the the Pump Station Rehabilitation Team. This team is comprised of operators, engineers, and maintenance staff and evaluates the pump stations on a monthly basis. This teams purpose is to recommend improvements and capital projects for the pump stations and ensure that plans and specifications are in place for the design, construction, and rehabilitation of the stations.

Over the past 9 years, the Pump Stations have been placed on a rigorous preventive maintenance program that is performed primarily by the mechanics and electricians assigned to each station. Preventive maintenance performed on the pump stations includes such items as checking seals, floats, valves, cleaning and painting of stations, and a regular wet-well cleaning program. Pump hours and preventive maintenance performed are documented in log books and an AIRC work order card system. Preventive maintenance, along with an aggressive capital improvement strategy for the Pump Stations, has resulted in well-maintained and efficient Pump Stations throughout the system.

The Division is currently working to implement the Datastream work order system for the pump stations and wastewater treatment plants. This work order system is replacing the previous system which used AIRC work order cards. This card system requires the purchase of cards that both costly and must be stored in hard format. The Datastream system will provide for a more formal preventive maintenance plan that would document in the database the work performed and schedule regular maintenance such as pulling and checking pumps as recommended by the manufacturer. Implementation has been slow due to the time needed to populate the database and the lack of resources, but the database is close to completion. Each pump station also has its own file for O&M manuals, including as-built drawings for newer stations. Duplicate copies of all O&M manuals are available at the respective

administrative offices of the Wastewater Treatment Division. These duplicates are to provide redundancy of the information for all components of the pump stations and treatment plants.

NCDENR inspects the pump stations during its annual collection system inspection. This normally involves a review of the log book, maintenance records, pump station plans, and other information required by the City's Collection System Permit.

The City also feels that they do not have any overloaded or capacity problems at pump stations and believes that increased preventive maintenance over the past 5 to 10 years has resulted in much improved stations. Although some isolated areas have experienced problems with excessive inflow and infiltration, Wastewater Treatment staff stated that there were no major inflow and infiltration problems throughout the system that have resulted in a sustained increase in pump station run times or operational costs. Corrosion and odor control issues are discussed in Section 5.2.5.

Pump Station Recommendations

1) In addition to manufacturer's recommended service, when implementing the new Datastream database, the City should consider adding preventive maintenance items such as simulating a power failure monthly to test back-up generators, maintenance and inspection of buildings, cleaning and de-greasing the station with a high pressure jet, vacuuming grit/debris build up in wet well, inspecting controls and cabling and tightening the contacts, lube-flushing the motors, and performing pump draw down tests to determine actual pumping capacity, etc. Although these items are being performed without Datastream, the CMMS would ensure that a work order for these items is generated automatically at a predetermined time interval.

2) Begin tracking the cost/savings associated with preventive maintenance of the Pump Stations. This information should be made available with use of the new Datastream system.

3) It is recommended that the City provide the Wastewater Treatment Division with at least one Instrumentation Technician to maintain and repair pump station controls. Technological advances in recent years have created a need for this position. Many of the electronic and digital components and controls in use in the pump stations are beyond the knowledge and scope of the City's electricians.

5.6 Pretreatment & FOG

The City of Wilmington's Pretreatment program is managed by the Environmental Services Division. Under this program, industrial and commercial establishments are regulated based on federal, state, and local requirements. The Fats, Oils, and Grease (FOG) program is also administered under the Pretreatment program.

5.6.1 Pretreatment

The City of Wilmington's Pretreatment program is staffed by environmental compliance officers. These officers ensure that industries comply with the City's Sewer Use Ordinance. Discharges from industrial and commercial establishments are regulated to protect the health and safety of the general public and City workers, to protect the environment, and to prevent chemical, biological, or physical disruptions at wastewater treatment plants.

As of June, 2006, the City has 5 Significant Industrial Users (SIUs). According to the USEPA, SIUs are wastewater contributors that are the focus of control efforts under the national pretreatment program. SIUs include all wastewater contributors subject to national categorical pretreatment standards, that contribute at least 25,000 gallons per day of process wastewater, or that make up five percent or more of the hydraulic or organic loading to a municipal wastewater treatment plant. The City's 5 SIUs include:

1. Unifirst Corporatioin
2. Corning
3. Dell Laboratories
4. AAI Pharma
5. New Hanover Regional Medical Center

All SIUs in the City are inspected twice per year with a full compliance audit being performed during one of these inspections. The SIUs must conduct monthly monitoring and submit that data to Environmental Services by the 10th day of each month following their monitoring event.

Two of the City's SIUs are pharmaceutical companies and are classified as Categorical Industries. Categorical Industries are industrial users subject to national categorical pretreatment standards determined by the USEPA. These standards establish limitations on pollutant discharges to municipal wastewater treatment systems and are governed by Section 307 of the Clean Water Act.

Pretreatment Recommendations

It is recommended that the City continue to maintain the current level of excellence in its pretreatment program. The diminishing number of SIUs in the system will oftentimes cause decreasing determination and resilience in the administration of a pretreatment program. For this reason, quality assurance procedures should be performed in the pretreatment section to ensure that the City's Sewer Use Ordinance is enforced.

It is further recommended that the City continue to locate other potential SIUs that have previously failed to be identified. The USEPA provides guidance for locating SIUs in their pretreatment program development information. This information is available on the USEPA website. Business licensing, building permits and economic

development data oftentimes will give insight as to the nature of business of particular customers and can be used to locate potential SIUs.

5.6.2 FOG

Fats, oils, and grease are discharged in wastewater by food service establishments, multi-family housing, and single family homes. FOG is a problem in the City's collection system causing frequent blockages that may result in SSOs from the collection system.

The City of Wilmington's FOG program is the one of the oldest and most comprehensive programs in the state. In 1986, the program received recognition from NCDENR and since that time has been used as a model for other programs throughout the state. The FOG program is managed and operated by environmental compliance officers as part of the Pretreatment program and is under the authority of the City's Sewer Use Ordinance, which is located in the City's General Ordinances under Chapter 12, Article III.

The City's FOG program has established requirements for food vendors including the submission and retention of proof that grease traps are pumped out and maintained. These records are submitted to the Pretreatment staff by the 15th of each month. Septic haulers, contracted by the food vendors, normally land apply the material from grease traps and oftentimes assist the vendors in the submission of monthly reports. Failure to provide these records results in enforcement actions being taken against the food vendor.

The FOG program is also active in educating commercial and residential customers in methods for reducing the amount of fats, oils, and greases discharged into the collection system. Educational brochures are available in several languages, and videos are available for residential customers and restaurants. Pretreatment personnel also visit local schools, restaurants, and civic group meetings to present the importance of properly managing FOG items at their facilities.

Enforcement Actions

Enforcement actions and monetary penalties are assessed and carried out under the authority of the Sewer Use Ordinance. These enforcements are performed in accordance with the City of Wilmington Enforcement Response Guide for varying issues by Environmental Compliance Officers. These environmental compliance officers are assigned to the Environmental Services Division of the Public Utilities Department. The City of Wilmington Enforcement Response Guide is included in Appendix C of this report.

Multi-Family Dwelling Units

It is suspected that multi-family residences (e.g., apartment complexes) are a significant source of grease into the City's sanitary sewer system. Because multi-family residences do not currently fall under the City's grease ordinance, there is currently not an inspection and enforcement mechanism as there is for commercial customers. Therefore, there may be a significant need to apply grease control

provisions to multi-family residences similar to those applied to other commercial customers in the City.

FOG Recommendation

It is recommended that the City implement inspection and enforcement measures for multi-family residences. While this may require changes to the City's ordinances to clarify this requirement, these measures could lead to a reduction of a large amount of grease being contributed to the City sewer system. Therefore, implementing these measures could reduce the potential for SSOs caused by grease blockages.

5.7 Equipment Management and Fleet Management

City staff report there are ample supplies of spare parts, tools, supplies, etc. for collection system maintenance. City personnel also report no deficiency in the inventory of spare parts for the pump stations. The number of generators is also adequate to provide emergency electricity during power outages.

Storage space for equipment and parts at the wastewater treatment plant and the Utility Operations Center is adequate. Each division has a warehouse and stores inventory for its operations; however, the space is limited and not climate controlled. There is plenty of parking space but little covered storage for vehicles.

The Utility Services Division and the Wastewater Treatment Division reported that there were enough vehicles for each maintenance person or crew to perform the assigned duties. However, no adequate replacement vehicles were available for either division when vehicles were out-of-service for repair or maintenance. Vehicles out-of-service delay or prevent critical collection system maintenance and repair. Also noted, was that vehicle maintenance and repairs required extensive amounts of time once delivered to Fleet Management.

Fleet Management provides repairs, maintenance, insurance, and replacement for all City-owned vehicles. According to Utility Services, all divisions are charged an estimated fee at the beginning of each fiscal year to cover repairs, maintenance, and replacement of City vehicles. Utility Services also reported that the rates charged by Fleet Management are inexpensive when compared to local market rates.

According to Fleet Management, their division manages, maintains, and repairs 600 pieces of City-owned rolling stock or vehicles. Utility Services is assigned 58 pieces of rolling stock, and Wastewater Treatment is assigned 25 pieces. Seven of the 25 pieces of rolling stock assigned to the Wastewater Treatment Division are designated for pump station operations.

Fleet Management leases vehicles to each City department or division for a predetermined annual fee that is based on the type and quantity of vehicles required. These fees cover all replacement, repair, and maintenance of rolling-stock except that belonging to the City's Fire Department and the Wilmington Transit Authority. The annual fee is determined by the average repair and maintenance cost for the number

of vehicles leased by each division. All fees are also based on the respective vehicle types.

Each year, prior to City budget preparations, the entire City fleet is evaluated. The vehicles are evaluated based on several areas including:

1) Mileage or hours of operation
2) Years in service
3) Repair/maintenance cost

If an evaluated vehicle has greater than 90,000 miles, greater than 9 years of service, or if the repair/maintenance cost is greater than 75% of the vehicles replacement cost, then the vehicle is listed for possible replacement. The Fleet Management Division uses a CCG Systems work order database known as FASTER to track the fleet and provide information for vehicle evaluations.

The FASTER work order database has performed well for Fleet Management and will not be replaced by the City-wide Datastream system. The FASTER system was developed for fleet-management-type operations and all Fleet Management personnel are familiar with its operations. An example work order from the FASTER system is located in Appendix E. The process used by Fleet Management to process a work order includes the following steps:

1) The division leasing the vehicle in need of repair or maintenance delivers the vehicle and keys to Fleet Management.
2) The delivering person fills out a Work Request form and turns in the keys at the Shop Office.
3) The Shop Office generates a work order in the FASTER system. This work order includes any upcoming preventive maintenance that is scheduled for the vehicle.
4) The Shop Foreman retrieves the work order from the FASTER system and assigns the work order to the proper Fleet Management personnel.
5) Repairs and maintenance items are performed. This information is documented on the work order, which is given back to the Shop Foreman.
6) The Shop Foreman inputs all information back into the FASTER system.
7) The proper division is contacted to pick up the vehicle.

The vehicles delivered to Fleet Management are prioritized on a scale from 1 to 5. Under this system a Priority 1 vehicle is the top priority for Fleet Management and is moved ahead of all other categories, and Priority 5 vehicles are non-priority vehicles which have no precedence in the order of vehicles being repaired or maintained. Currently, about 50% of the City's Fleet is categorized as Priority 1 vehicles, which receive precedence when repairs are needed. The high percentage of Priority 1 renders the prioritization system all but ineffective for Utility Services given the high

quantity of Priority 1 vehicles such as public safety (police) and sanitization (garbage collection).

All vehicle and rolling stock purchases are also handled through Fleet Management. A division requesting to add vehicles to their inventory prepares an enhanced budget request. Once funds are approved and have been appropriated, Fleet Management will work with the requesting division to develop a Request for Proposal (RFP) and specifications for the new vehicle. The RFP and specifications are sent to the Purchasing Department, which advertises the RFP, takes bids, and purchases the vehicle. Fleet Management then leases the vehicle to the requesting department.

Currently, there are 14 persons assigned to the Fleet Management Division. **Table 5-3** contains a breakdown of the division by job title, number of employees, and pay grade.

Table 5-3
Fleet Management Personnel and Descriptions

Number of Employees	Job Title	Pay Grade
1	Fleet Manager	C41
1	Shop Foreman	B31
1	Warehouse Technician	A13
1	Administrative Support Technician	A13
1	Welder/Fabricator	B22
8	Auto/Equipment Mechanics	B22

Equipment Management and Fleet Management Recommendations

It is also recommended that the City document and track spare parts inventory and standardize equipment as much as possible to make it easier to stock the necessary supplies of spare parts and limit downtime of equipment. Incorporate the documentation and tracking of spare parts as part of the FASTER database.

A reevaluation of the prioritization system of Fleet Management should be performed. Focus should be placed on necessity, public interest, replacement cost, cost of providing and storing spare vehicles, number of personnel affected by single piece of equipment, number of redundant vehicles of same type, and cost of contracting/renting equipment to perform the same tasks. An effective system of

prioritization should assign the highest priority classification to approximately 15% of the entire fleet. Vehicles critical to preventing SSOs and protecting public health should be Priority 1.

The City should consider implementation of a system that transitions repairs of priority vehicles to a contracted repair garage when the elapsed time of a vehicle in for repairs exceeds a predetermined number of days. This will lessen the backlog at Fleet Management, provide more available time for preventive maintenance tasks, and expedite the repair of vehicles.

Section 6
Performance Indicators

The purpose of this section is to discuss and recommend performance indicators for the City of Wilmington's wastewater collection system. These performance indicators will assist the City in documenting existing collection system performance, developing a means by which improvements in the management, operation, and maintenance of the wastewater may be measured in the future and benchmarks portions of the collection system against other top performing systems.

The Water Environment Research Federation (WERF) has defined two types of benchmarking, metric and process, that are beneficial to wastewater collection systems. Metric benchmarking is a quantitative measurement of performance in terms of inputs, outputs, outcomes and the relationships among the terms. Process benchmarking is an evaluation of a collection system's process and subsequently comparing it to those of other collection systems with exemplary performance.

According to WERF, metric benchmarking, based on simple input and output ratios, is used extensively in the wastewater industry. An example of this type of benchmarking used in a collection system is a comparison of revenue to expenditures to establish an adequate billing rate.

Process benchmarking is also valuable to collection systems. According to WERF, a collection system develops a detailed understanding of the processes of the particular operation or maintenance function, identifies other systems that perform similar processes in an exemplary fashion, and then compares their own process to the similar process of the other systems. Benefits of this type of analysis include detailed insight into the collection systems own processes and new ideas gained from observing work at the exemplary systems.

Performance indicators are often used in order to perform beneficial benchmark evaluations. In order to effectively establish performance indicators for the collection system, categories were established to provide adequate organization. The categories include overall system information, budget information, staffing and equipment information, and system performance.

6.1 Overall System Information

Overall system information, consisting of the customer population, total length of sewer in the system, the total number of lift stations, the average age of the collection system, and the average flow of wastewater conveyed by the system is valuable for indicating the current status and size of the wastewater system. **Table 6-1** includes the 2006 data for the City's collection system.

Table 6-1
2006 Overall System Information

Category	Value
Customer Population	87,330
Total Length of Collection System (Miles of gravity and force mains)	384
Number of Pump Stations	30
Average Age of System (years)	38
Average Daily Flow (MGD)	16.15

An important value that can be used to evaluate the growth of the system over a period of time is the number of people per mile of collection system. The number of people per mile of collection system is a good indication of the density of users on the system. As long as capacity is adequate to serve the peak demands of the population density, revenue increases as the density of people on the system increases. Currently, there are 227.4 people per mile of the collection system.

Another method of displaying the density of users on the system is to assign an equivalent dwelling unit (EDU) to each customer. An EDU would be assigned based on the type and size of the collection system customer. For example a single family residence may be assigned an EDU of 3.6 while a large industrial user may be assigned an EDU of 19.5. These EDUs could then be used to determine the miles of system per EDU. This would normalize the data and could provide a more accuratre representation of the demand on the system.

6.2 Budget Indicators

Budget indicators can be used to measure and compare overall operations and maintenance program expenditures. **Table 6-2** contains budget information from the City that is useful in determining the allocation of funds to the collection system and provides a method of tracking the efficiency of these funds.

Table 6-2
2005 Collection System Budget Information

Item	Amount
Total Collection System Operating Budget	$3,200,000
Utility Services Division Collection System Operating Budget	$1,600,000
Wastewater Treatment Division Pump Station Operating Budget	$1,600,000
Wastewater Treatment Division Budget per Pump Station	$53,333
Utility Services Division Budget per Mile of Sewer	$4,167

Several budget indicators that could assist the City in assessing the allocation of funds to the collection system are comparisons of the amount of the operating budget of the collection system that is spent on corrective and preventive maintenance. These amounts should be assessed separately for the pump stations and sewer mains. A typical evaluation of the cost associated with a preventive maintenance program normally reveals that total maintenance expenditures increase during the beginning of the program. As a result of continued preventive maintenance, long term corrective maintenance cost decline, and the total maintenance costs are reduced below the initial level. This cycle is shown in **Figure 6-1**.

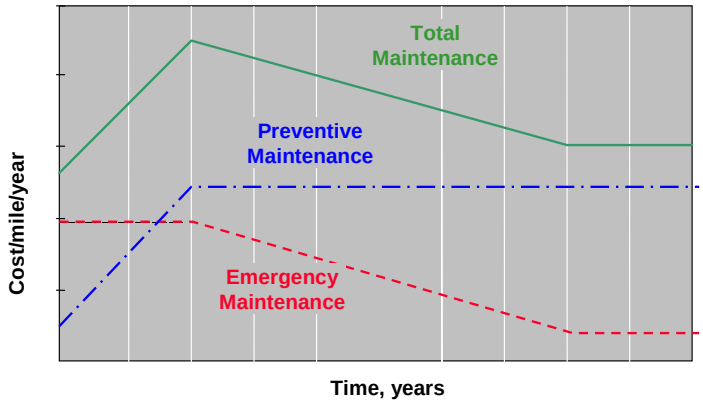


Figure 1
With Continued Preventive Maintenance, Emergency Maintenance Costs Decline.

In order for the City to utilize these budget indicators, a record of preventive and corrective maintenance must be kept. The CMMS used by the City should be configured to collect and provide (at a minimum) the following information:

- Overall pump station staff hours spent on corrective maintenance of the pump stations
- Overall pump station staff hours spent on preventive maintenance of the pump stations
- Amount of pump station budget spent on corrective maintenance
- Amount of pump station budget spent on preventive maintenance
- Overall Utility Services collection system staff hours spent on corrective maintenance of the collection system
- Overall Utility Services collection system staff hours spent on preventive maintenance of the collection system
- Amount of Utility Services collection system budget spent on corrective maintenance
- Amount of Utility Services collection system spent on preventive maintenance

6.3 Staff and Equipment Indicators

Staff and equipment indicators are used to evaluate the allocation of resources used in pump station and collection system operations and maintenance. **Table 6-3** provides the current information pertaining to staff and equipment indicators.

Table 6-3
2006 Collection System Staff and Equipment

Item	Quantity
Total Dedicated Collection System Personnel	28
Total Personnel Dedicated to Pump Station O&M	10
Total Personnel Dedicated to Gravity Sewer and Force Main O&M	19

From the provided information, several key staff and equipment indicators can be calculated.

Using staff information provided several key indicators can be calculated. The number of lift stations per dedicated O&M personnel, the miles of collection system per dedicated O&M personnel, and the population per number of collection system personnel can all be used to as a comparison of staff allocation. Each of these values is shown in **Table 6-4**. These values can then be compared to the overall operations and

maintenance of the system to begin developing staffing needs. These values also provide an initial baseline for comparison of future staff allocation.

Table 6-4
2006 Staff Indicators

Indicator	Value
Number of Lift Stations per Dedicated O&M Personnel	3.33
Miles of Collection System per Dedicated O&M Personnel	20.2
Population per Number of Collection System Personnel	3011.4

6.4 Performance Indicators

Performance indicators are used to evaluate the effectiveness of the City's sewer maintenance programs in meeting customer service, property protection, and environmental protection goals. These performance indicators include:

- the number of collection system complaints received per day,
- the percentage of the gravity collection system cleaned per year,
- the volume of SSOs versus the volume contained in the system
- the number of lift station failures per year,
- the number of sewer stops reported per month,
- the number of main blockages per month,
- the number of SSOs per year,
- and the total gallons of SSOs recorded per year.

The current values of these performance indicators are provided in Table 6-5.

Table 6-5
2006 Performance Indicators

Indicator	Value
Number of collection system complaints per day	17
Percentage of gravity collection system cleaned per year	13.3%
Number of lift station failures per year	0
Number of sewer stops reported per month	50
Number of main blockages per month	15
Number of SSOs per year	595
Total gallons of SSOs reported per year (2005)	3,927,552

Other valuable performance indicators that can be used to determine the efficiency of the collection system operations and maintenance are the percentage of collection system rehabilitated per year, the efficiency of the cleaning crews in comparison to the maximum amount of cleaning possible, and the percentage of repeat customer complaints.

As a comparison, the maximum amount of sewer that can be hydraulically cleaned given the City's current equipment can be calculated by the following equation:

Maximum annual production = (2000' per day)(5 days per week)(52 weeks per year)

Thus the maximum annual cleaning with one cleaning hydraulic cleaning crew is 520,000 feet of gravity sewer. In 2005, the City's crew cleaned 252,745 feet of gravity sewer for an efficiency of 48.6%.

Data needed to establish the performance indicators shown above should be implemented into the CMMS. This would allow the City to perform annual evaluations of the systems performance and determine the areas of the collection system that need additional attention.

Care should be taken when selecting and evaluating performance indicators for the City's collection system. According to WERF, performance indicators have advantages and disadvantages. The advantages of performance indicators include the ease of understanding and the ability to monitor annual improvements. However, disadvantages of performance indicators include limited usefulness without full understanding of the data, potential errors in the information gathered, and oftentimes multiple performance measures are needed to diagnose a problem.

With consideration of various explanatory factors, performance indicators are a useful tool in evaluating the overall management, operations, and maintenance of a wastewater collection system.

Appendix A

Chuck
File

State of North Carolina
Department of Environment
and Natural Resources
Division of Water Quality

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Kerr T. Stevens, Director

NCDENR
NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES

July 18, 2001

MR. HUGH T. CALDWELL, DIRECTOR OF PUBLIC UTILITIES
CITY OF WILMINGTON
POST OFFICE BOX 1810
WILMINGTON, NORTH CAROLINA 28402

Subject: Permit No. WQCS00012
City of Wilmington
Wilmington Wastewater Collection System
New Hanover County

Dear Mr. Caldwell:

In accordance with your permit application package received on January 18, 2001, as well as the additional information received on May 17, 2001; June 14, 2001; June 27, 2001; and June 28, 2001; we are forwarding herewith Permit No. WQCS00012, dated July 18, 2001, to the City of Wilmington for the operation and maintenance of the subject wastewater collection system.

This permit shall be effective from the date of issuance until June 30, 2006 and shall be subject to the conditions and limitations specified therein.

This comprehensive wastewater collection system permit includes conditions that cover all of the Spill Response Factors as well as the Operation and Maintenance Evaluation Factors contained in the Updated Collection System Enforcement Guidance that was issued on June 14, 1999 by the Division of Water Quality (Division). Therefore, **this permit supercedes the 1999 point system** used to determine enforcement options for sanitary sewer overflows (SSOs). The evaluation of enforcement options after a SSO will be determined by considering the criteria listed in Condition I. 2. of this permit. Compliance with the all conditions of the permit shall be in accordance with established policies and North Carolina General Statutes §143-215.6A through §143-215.6C. If you have questions regarding permit compliance, please contact the Division's Wilmington Regional Office or Mr. Jeff Poupart of the Division's Non-Discharge Compliance/Enforcement Unit at (919) 733-5083, extension 527.

It is your responsibility to review and understand this permit thoroughly. Please pay particular attention to the monitoring and reporting requirements in this permit. Failure to abide by the conditions in this permit may subject the Permittee to enforcement action. Of special interest are the following conditions:

- System Description: The description of the permitted wastewater collection system reflects the quantity of the various components of the system at the time of permit application. Note that these quantities may increase or decrease during the permit cycle; however, it shall not be necessary for the Permittee to amend these quantities until permit renewal time. Be aware that the conditions of this permit are valid for the entire system, regardless of how it changes.

- Condition I. 2.: Language has been added to this condition that establishes operation and maintenance responsibility at two pump stations that the Permittee jointly operates and maintains with New Hanover County (i.e., COW No. 34 and COW No. 35). Note that should the Director be unable to determine exact responsibility for a discharge at either of these pump stations, enforcement action may be taken against both the Permittee and New Hanover County.

- Condition I. 5.: At the request of the Permittee, permit template language regarding typical characteristics of a capital improvement plan has been stricken from this condition.

- Condition I. 7.: Language has been added to this condition to acknowledge the fact that a pump in a simplex pump station or pump station not capable of pumping at a rate of 2.5 times the average daily flow rate may be fixed or otherwise corrected in addition to being replaced in the event of a failure.

- Condition I. 8.: This condition has been amended to reflect the fact that the Permittee's existing pump station identification signs simply provide emergency contact telephone numbers (i.e., no calling directions). However, language has been added that requires the Permittee to include instructions on all future signs that the number should be called if the visual alarm illuminates, if the audible alarm sounds, or if an emergency situation is apparent on new signs or when the existing signs are replaced.

- Condition I. 10.: All of the pump stations currently existing in the Permittee's wastewater collection system are equipped with telemetry that employs an automatic polling feature and, therefore, do not need to be retrofitted with audible and visual alarms. However, please note that all pump stations to be added to the system in the future shall have audible and visual alarms unless a specific variance from 15A NCAC 2H .0219 (h)(5) is requested and granted during the Division's wastewater collection system extension permit review process.

- Condition III. 3.: It is the Division's understanding that the Permittee's existing wastewater collection system map does not contain information about pump station capacity or the number of active service taps. This information is planned for incorporation into the map within 18 months of this permit's issuance. However, because this schedule will allow the map to be completed well within the maximum 10-year timeframe required by the Division, no compliance language has been added to this condition.

If any parts, requirements, or limitations contained in this permit are unacceptable, you have the right to request an adjudicatory hearing upon written request within 30 days following the receipt of this permit. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27699-6714. Unless such demands are made, this permit shall be final and binding.

If you need additional information concerning this matter, please contact Ms. Shannon Mohr Thornburg by telephone at (919) 733-5083, extension 353, or via e-mail at shannon.thornburg@ncmail.net.

Sincerely,

Kerr T. Stevens

cc: Mr. William T. Justice, Jr. (ORC), City of Wilmington
Mr. Richard S. Fasnacht (Back-Up ORC), City of Wilmington
Mr. Kenneth L. Vogt, Jr. (Back-Up ORC), City of Wilmington
New Hanover County Health Department
Wilmington Regional Office, Water Quality Section
Technical Assistance and Certification Unit
Non-Discharge Compliance/Enforcement Unit
NDPU File WQCS00012

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

RALEIGH

SYSTEM-WIDE WASTEWATER COLLECTION SYSTEM PERMIT

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations

PERMISSION IS HEREBY GRANTED TO

City of Wilmington

New Hanover County

FOR THE

operation and maintenance of a wastewater collection system consisting of approximately 370 miles of gravity sewer; approximately 25 miles of force main; less than one mile of pressure sewer, 28 pump stations with pump reliability that serve more than one building; one pump station, excluding the screening and grit removal equipment (i.e., part of the New Hanover County Wastewater Collection System), with pump reliability that serve more than one building; one simplex pump station that discharges to a pressure sewer and serves more than one building; two simplex pump stations that discharge to a pressure sewer and serve a single building; and all associated piping, valves, and appurtenances required to make a complete and operational wastewater collection system to serve the City of Wilmington, any deemed permitted satellite wastewater collection systems, and the following tributary satellite wastewater collection systems that are subject to an individual permit: New Hanover County Wastewater Collection System and Wrightsville Beach Wastewater Collection System. The above-described wastewater collection system shall be pursuant to the application received on January 18, 2001 and the additional information received on May 17, 2001; June 14, 2001; June 27, 2001; and June 28, 2001 as well as in conformity with the documents referenced therein and other supporting data subsequently filed and approved by the Department of Environment and Natural Resources and considered a part of this permit.

This permit shall be effective from the date of issuance until June 30, 2006 and shall be subject to the following specified conditions and limitations:

I. PERFORMANCE STANDARDS

1. The sewage and wastewater collected by this system shall be treated in either the City of Wilmington's James A. Loughlin (Northside) Wastewater Treatment Plant (i.e., NPDES Permit No. NC0023965) or the City of Wilmington's M'Kean Maffitt (Southside) Wastewater Treatment Plant (i.e., NPDES Permit No. NC0023973) prior to being disposed into the receiving stream. This collection system permit shall be referenced upon renewal or modification of the NPDES permit for this facility.

2. The wastewater collection system shall be effectively managed, maintained, and operated at all times so that there is no discharge to land or surface waters nor any contamination of groundwater. In the event that the wastewater collection system fails to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective actions, including actions that may be required by the Division of Water Quality (Division), such as the construction of additional or replacement sewer lines and/or equipment.

   The Director may take enforcement action against the Permittee for a sanitary sewer system discharge caused by natural conditions or exceptional events **unless** the Permittee demonstrates through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. The discharge was caused by severe natural conditions; there were no feasible alternatives to the discharge, such as the use of auxiliary treatment facilities, retention of untreated wastewater, reduction of inflow and infiltration, use of adequate backup equipment, or an increase in the capacity of the system. This provision is not satisfied if, in the exercise of reasonable engineering judgment, the Permittee should have installed auxiliary or additional collection system components, wastewater retention or treatment facilities, adequate back-up equipment or should have reduced inflow and infiltration; or

   b. the discharge was exceptional, unintentional, temporary and caused by factors beyond the reasonable control of the Permittee; the discharge could not have been prevented by the exercise of reasonable control, such as proper management, operation and maintenance; adequate treatment facilities or collection system facilities or components (e.g., adequately enlarging treatment or collection facilities to accommodate growth or adequately controlling and preventing infiltration and inflow); preventive maintenance; or installation of adequate backup equipment;

   The Permittee shall submit a claim to the Director that the discharge meets the criteria of this condition within 10 working days (i.e., Monday through Friday, excluding State holidays) of the date of the discharge. The Permittee has the burden of proof that the above criteria have been met.

   It is the Division's understanding that the two pump stations known by the identifiers COW No. 34 and COW No. 35 are jointly operated and maintained by both the Permittee and New Hanover County. The Permittee is responsible for the operation and maintenance of the pump stations as well as for the operation and maintenance of the screening and grit removal equipment at COW No. 34. New Hanover County is responsible for the operation and maintenance of the screening and grit removal equipment at COW No. 35. Therefore, the Permittee shall be responsible for those discharges associated with COW No. 35 following its influent structure only. Discharges resulting from the failure to operate and maintain the screening and grit removal equipment at COW No. 35 properly shall be the responsibility of New Hanover County, as established under its individual system-wide wastewater collection system permit issued by the Division. Likewise, any discharge associated with COW No. 34 shall be the sole responsibility of the Permittee. Should the Director be unable to determine exact responsibility for a discharge at either of these pump stations, enforcement action may be taken against both the Permittee and New Hanover County.

3. The Permittee shall have the legal authority to implement the requirements of Condition I. 4., require new sewers be properly constructed, ensure proper inspection and testing of sewers and laterals, and address flows from satellite systems.

4. The Permittee shall maintain an educational and enforcement program that requires the proper operation and maintenance of all grease traps and septic tanks connected to the wastewater collection system. The educational program shall target both residential and commercial users.

5. The Permittee shall implement a Capital Improvement Plan (CIP) to designate funding for reinvestment into the wastewater collection system infrastructure. The CIP shall address short-term needs and long-term "master plan" concepts.

6. Existing overflow piping from manholes and pump stations, excluding piping to approved equalization structures, shall be immediately removed or permanently capped. Plugged emergency pumping connections shall be allowable for portable pumping or rerouting without intentionally bypassing the wastewater treatment facility.

7. The Permittee shall maintain a contingency plan for pump failure at each pump station. If one of the pumps in a pump station containing multiple pumps fails, the process of repairing or replacing the pump shall be initiated immediately and the new parts or pump shall be installed as soon as possible. If the pump in a simplex pump station or a pump station not capable of pumping at a rate of 2.5 times the average daily flow rate fails, it shall be replaced, fixed or otherwise corrected immediately.

8. Each pump station shall be clearly and conspicuously posted with a pump station identifier and an emergency contact telephone number through which an individual who can initiate or perform emergency service for the wastewater collection system 24 hours per day, seven days per week can be contacted. Existing signs, when replaced, and new signs shall include language that couples the emergency contact telephone number with instructions for any one to call if the visual alarm illuminates, if the audible alarm sounds, or if an emergency situation is apparent.

9. Pump station sites, equipment, and components shall have restricted access, per 15A NCAC 2H .0219(h)(7).

10. Pump stations that do not employ an automatic polling feature (i.e., routine contact with pump stations from a central location to check operational status of the communication system) shall have both audible and visual high-water alarms. The alarms shall be weatherproof and placed in a clear and conspicuous location. Permits issued for the construction of pump stations that included high-water alarms in the description shall maintain the alarms even if simple telemetry (i.e., notification of an alarm condition initiated by the pump station control feature) is installed.

11. For all newly constructed, modified, and rehabilitated pump stations, equipment and components located within the pump station shall be corrosion resistant, and components in close proximity of the pump station shall be sealed within a corrosion-resistant coating or encasement.

12. All construction and rehabilitation of the wastewater collection system (i.e., permitted or deemed permitted) shall be scheduled so as to minimize the interruption of service by the existing utilities. Construction and rehabilitation shall not result in the violation of Condition I. 2. of this permit.

II. OPERATION AND MAINTENANCE REQUIREMENTS

1. Upon classification of the system by the Water Pollution Control System Operators Certification Commission (WPCSOCC), the Permittee shall designate a certified wastewater collection system operator to be the Operator in Responsible Charge (ORC) of the wastewater collection system. The operator shall hold a valid certificate of the type and grade at least equivalent to or greater than the classification assigned to the wastewater collection system by the WPCSOCC. The Permittee shall also designate one or more Back-Up ORC(s) who possess(es) a valid certificate of the type and grade of the system that is no more than one grade less than the grade of the system. The ORC of the system shall visit the system within 24 hours of knowledge of a bypass, spill, or overflow of wastewater from the system, unless visited by the Back-Up ORC, and shall comply with all other conditions of 15A NCAC 8G .0204.

2. The Permittee shall develop and maintain a schedule for reviewing all inspection, maintenance, operational and complaint logs. Once recurring problems are identified in the wastewater collection system as a result of the review process, the Permittee shall establish a plan for addressing the problem(s) if they can not be resolved in a short time period. The Permittee shall define and adhere to a review period.

3. The Permittee shall develop and maintain a schedule for testing emergency and stand-by equipment.

4. The Permittee shall develop and conduct a routine pump station inspection and maintenance program, which shall include, but not be limited to, the following maintenance activities:

   a. Cleaning and removing debris from the pump station structure, outside perimeter, and wet well;

   b. Inspecting and exercising all valves;

   c. Inspecting and lubricating pumps and other mechanical equipment according to the manufacturer's recommendations; and

   d. Verifying the proper operation of the alarms, telemetry system and auxiliary equipment.

5. For each pump station without pump reliability (i.e. simplex pump stations serving more than a single building or pump stations not capable of pumping at a rate of 2.5 times the average daily flow rate with the largest pump out of service), at least one fully operational spare pump capable of pumping peak flow shall be maintained on hand.

6. The Permittee shall maintain on hand at least two percent of the number of pumps installed, but no less than two pumps, that discharge to a pressure sewer and serve a single building, unless the Permittee has the ability to purchase and install a replacement pump within 24 hours of first knowledge of the simplex pump failure or within the storage capacity provided in any sewer line extension permit.

7. Rights-of-way shall be properly maintained to allow accessibility to the wastewater collection system.

8. The Permittee shall assess cleaning needs and develop and maintain a program for appropriately cleaning, whether by hydraulic or mechanical methods, all sewer lines. At least 10 percent of the wastewater collection system, selected at the discretion of the ORC, shall be cleaned each year. Preventative cleaning is not required for sewer lines less than five years old unless inspection otherwise reveals a necessity or as required by a sewer line extension permit.

9. Adequate measures shall be taken to contain Sanitary Sewer Overflows (SSOs) and spills. The Permittee shall maintain a Response Action Plan that addresses the following minimum items:

   a. Contact phone numbers for 24-hour response, including weekends and holidays;

   b. Response time;

   c. Equipment list and spare parts inventory;

   d. Access to cleaning equipment;

   e. Access to construction crews, contractors and/or engineers;

   f. Source(s) of emergency funds;

   g. Site sanitation and clean up materials; and

   h. Post-overflow/spill assessment.

10. The Permittee shall conduct an on-site evaluation for all SSOs and spills as soon as possible, but no more than two hours after first knowledge of the overflow and/or spill.

11. In the event of a discharge from or blockage within the wastewater collection system, the Permittee shall restore the system operation, remove visible solids and paper, sanitize any ground area and restore the surroundings.

III. RECORDS

1. Records shall be maintained to document compliance with Condition I. 4., Conditions II. 2. through II. 4., Conditions II. 7. through II. 8., Condition IV. 3., and Conditions V. 1. through V. 4. Records must be kept on file for a minimum of three years.

2. Adequate records pertaining to SSOs, spills, and complaints shall be maintained by the Permittee for a minimum of three years. These records shall include, but are not limited to, the following information:

   a. Date of overflow and/or spill or complaint;

   b. Volume of wastewater discharged as a result of the overflow and/or spill or nature of complaint;

   c. Location of overflow and/or spill or complaint;

   d. Estimated duration of the overflow and/or spill;

   e. Individual from the Division who was informed about the overflow and/or spill or complaint, when applicable;

   f. Final destination of the overflow and/or spill;

   g. Corrective actions;

   h. Known environmental/human health impacts resulting from the overflow and/or spill; and

   i. How the overflow and/or spill was discovered.

3. The Permittee shall maintain an up-to-date, accurate, comprehensive map of their wastewater collection system that also notes the locations where other wastewater collection systems become tributary. If a comprehensive map of the collection system has not been established, a rough sketch shall be drawn and the Permittee shall map approximately 10 percent of their collection system each year for the next 10 years, or until complete, whichever is sooner. The comprehensive map shall include, but is not limited to: pipe size, pipe material, pipe location, flow direction, approximate pipe age, number of active service taps, as well as each pump station's identification, location and capacity.

4. The Permittee shall maintain records of all of the modifications and extensions to the collection system permitted herein. A copy of the construction record drawings and specifications for modifications/extensions to the wastewater collection system shall be maintained on file by the Permittee for the life of the modification/extension and information concerning the extension shall be incorporated into the map of the wastewater collection system within one year of the completion of construction. The system description contained within this permit shall be updated to include this modification/extension information upon permit renewal.

IV. MONITORING AND REPORTING REQUIREMENTS

1. Any monitoring (i.e., including wastewater flow, groundwater, surface water, soil or plant tissue analyses) deemed necessary by the Division to ensure surface water and groundwater protection shall be established, and an acceptable sampling and reporting schedule shall be followed.

2. The Permittee shall report to the Wilmington Regional Office, at telephone number (910) 395-3900 or facsimile number (910) 350-2004, as soon as possible, but in no case more than 24 hours following the occurrence or first knowledge of the occurrence of either of the following:

   a. Any SSO and/or spill over 1,000 gallons; or

   b. Any SSO and/or spill, regardless of volume, that reaches surface water.

Overflows and spills occurring outside normal business hours may also be reported to the Division's Emergency Response personnel at telephone number (800) 662-7956, (800) 858-0368, or (919) 733-3300. Persons reporting any of the above occurrences shall file a Spill Response Form within five working days (i.e., Monday through Friday, excluding State holidays) following first knowledge of the occurrence. This report shall outline the actions taken or proposed to be taken to ensure that the problem does not recur.

3. The Permittee shall meet the annual reporting and notification requirements provided in North Carolina General Statute §143-215.1C.

V. INSPECTIONS

1. The Permittee or the Permittee's designee shall inspect the wastewater collection system regularly to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes to the environment, a threat to human health, or a nuisance. The Permittee shall keep an inspection log or summary including at least the date and time of inspection, observations made, and any maintenance, repairs, or corrective actions taken by the Permittee. This log of inspections shall be maintained by the Permittee for a period of at least three years from the date of the inspection and shall be made available upon request to the Division or other permitting authority.

2. Pump stations without Supervisory Control and Data Acquisition (SCADA) systems or telemetry shall be inspected daily as defined in 15A NCAC 2B.0503(5) until July 1, 2001 and, thereafter, every day. Pump stations equipped with SCADA systems or telemetry shall be inspected at least once per week.

3. A general observation of the entire collection system shall be performed throughout the course of every year.

4. Inspections of all high-priority lines (i.e., aerial lines, sub-waterway crossings, siphons, lines contacting surface water, lines running parallel to streambanks that are subject to erosion which may threaten the sewer line, and any other segment of the wastewater collection system that is designated as high-priority line in a permit) shall be performed at least once every six months. High-priority lines that are subject to the requirements of this condition as of this permit's issuance date is presented in Attachment A.

VI. GENERAL CONDITIONS

1. This permit shall become voidable unless the wastewater collection system is maintained and operated in accordance with the conditions of this permit and other supporting data.

2. This permit shall not be transferable. In the event there is a desire for the wastewater collection system to change ownership, or there is a name change of the Permittee, a formal permit request shall be submitted to the Division accompanied by documentation from the parties involved and other supporting materials as may be appropriate. The approval of this request shall be considered on its merits and may or may not be approved.

3. Failure to abide by the conditions and limitations contained in this permit may subject the Permittee to an enforcement action by the Division in accordance with North Carolina General Statutes §143-215.6A through §143-215.6C, and a sewer moratorium may be established.

4. The issuance of this permit shall not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e., local, state, and federal) having jurisdiction, including but not limited to applicable river buffer rules in 15A NCAC 2B .0200, soil erosion and sedimentation control requirements in 15A NCAC Ch. 4 and under the Division's General Permit NCG0100000, any requirements pertaining to wetlands under 15A NCAC 2B .0200 and 15A NCAC 2H .0500, and all applicable North Carolina Occupational Safety and Health Act health and safety standards.

5. The issuance of this permit shall not prohibit the Division from reopening and modifying the permit, revoking and reissuing the permit, or terminating the permit as allowed by the laws, rules, and regulations contained in 15A NCAC 2H .0200 and North Carolina General Statute §143-215.1 et al. or as needed to address changes in federal regulations with respect to the wastewater collection system.

6. The Permittee shall pay the annual fee within 30 days after being billed by the Division. Failure to pay the fee accordingly may cause the Division to initiate action to revoke this permit as specified by 15A NCAC 2H .0205(c)(4).

7. The Permittee shall request its renewal at least six months prior to the expiration of this permit. Upon receipt of the request, the Division shall review the adequacy of the wastewater collection system described therein, and if warranted, shall extend the permit for a period of time and under such conditions and limitations, as the Division may deem appropriate.

8. The Permittee shall notify the Division's Non-Discharge Permitting Unit in writing at 1617 Mail Service Center, Raleigh, North Carolina 27699-1617 of any changes to the name and/or address of the responsible party (i.e. mayor, manager) of the wastewater collection system.

9. Any duly authorized officer, employee, or representative of the Division may, upon presentation of credentials, enter and inspect any property, premises or place on or related to the collection system at any reasonable time for the purpose of determining compliance with this permit, may inspect or copy any records that must be maintained under the terms and conditions of this permit, and may obtain samples of wastewater, groundwater, surface water, soil, or plant tissue.

Permit issued this the eighteenth day of July, 2001

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Kerr T. Stevens, Director
Division of Water Quality
By Authority of the Environmental Management Commission

Permit Number WQCS00012

ATTACHMENT A

High-Priority Lines Subject to the Requirements of Condition V. 4. (As of July 18, 2001)

1. Burnt Mill Creek Outfall
2. East Lakeshore Drive and Lake Branch Drive
3. Greenfield Lake Crossing
4. Hewlett's Creek Outfall
5. Hunters Trail
6. Jump'n Run Creek
7. Love Grove Outfall
8. Maides Park Outfall
9. McCumbers Ditch
10. Mineral Springs Outfall
11. North Side Discharge Line
12. North 6th Street and Compton Street (High-priority line will be relocated as part of the Smith Creek Parkway project)
13. North 23rd Street Crossing
14. Parmele Street
15. Smith Creek Outfall
16. South 13th Street and Lakeshore Drive
17. Wellington Outfall

Copy to Bill Justice, Ken Vogt, Chuck Davis
File orig in collection syst permit

Michael F. Easley, Governor
William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources
Gregory J. Thorpe, Ph.D., Acting Director
Division of Water Quality

RECEIVED
MAY 23 2002

May 13, 2002

Mr. Hugh Caldwell, Director of Public Utilities
City of Wilmington
PO Box 1810
Wilmington, NC 28402

Subject: Permit No. WQCS00012 Modification
City of Wilmington
Wastewater Collection System
New Hanover County

Dear Mr. Caldwell:

The Division has modified Condition I(2) of the subject permit regarding the prohibition of overflows. Currently, your permit condition indicates that the Permittee had the option of submitting a justification to the Division Director for exemption from enforcement for any overflows that were caused by a severe natural condition or beyond the reasonable control of the Permittee. Now, a threshold limit as to when justifications can be submitted has been incorporated at the request of other collection system owners. The threshold is the same as the current reporting requirements (1,000 gallons or more or anything to surface waters). This means that if a spill does not have to be reported to the Division, there is no need to prepare a justification for that spill. It is very important to emphasize that this condition does not mean that a justification **should** be submitted for every reportable spill. Only spills that can be proven to be beyond prevention will be reviewed by the Division. Additionally, any justifications should now be submitted to the appropriate Division regional office instead of the Division Director. The Non Discharge Compliance Unit is currently working on guidance on the justification content. This will be made available on their web site and forwarded to current and future Permittee's when complete.

Enclosed herewith are modified Pages 1 - 2 of the subject permit, issued July 18, 2001, for the subject collection system. **Please replace Pages 1 - 2 with the corrected Pages 1 - 2 into the subject permit.** Also retain this letter for your permit file. If you have any questions regarding this request, please do not hesitate to contact Marie Doklovic at (919) 733-5083, extension 371. Thank you for your cooperation.

Sincerely,

Gregory J. Thorpe, Ph.D.

Cc: New Hanover County Health Department
William Justice /Richard Fasnacht/Kenneth Vogt, City of Wilmington
Wilmington Regional Office, Water Quality Section
Non-Discharge Compliance and Enforcement Unit
Technical Assistance and Certification Unit
Water Quality Central Files
Permit Application File WQCS00012

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

RALEIGH

SYSTEM-WIDE WASTEWATER COLLECTION SYSTEM PERMIT

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations

PERMISSION IS HEREBY GRANTED TO

City of Wilmington

New Hanover County

FOR THE

operation and maintenance of a wastewater collection system consisting of approximately 370 miles of gravity sewer; approximately 25 miles of force main; less than one mile of pressure sewer, 28 pump stations with pump reliability that serve more than one building; one pump station, excluding the screening and grit removal equipment (i.e., part of the New Hanover County Wastewater Collection System), with pump reliability that serve more than one building; one simplex pump station that discharges to a pressure sewer and serves more than one building; two simplex pump stations that discharge to a pressure sewer and serve a single building; and all associated piping, valves, and appurtenances required to make a complete and operational wastewater collection system to serve the City of Wilmington, any deemed permitted satellite wastewater collection systems, and the following tributary satellite wastewater collection systems that are subject to an individual permit: New Hanover County Wastewater Collection System and Wrightsville Beach Wastewater Collection System. The above-described wastewater collection system shall be pursuant to the application received on January 18, 2001 and the additional information received on May 17, 2001; June 14, 2001; June 27, 2001; and June 28, 2001 as well as in conformity with the documents referenced therein and other supporting data subsequently filed and approved by the Department of Environment and Natural Resources and considered a part of this permit.

This permit shall be effective from the date of issuance until June 30, 2006 and shall be subject to the following specified conditions and limitations:

I. PERFORMANCE STANDARDS

1. The sewage and wastewater collected by this system shall be treated in either the City of Wilmington's James A. Loughlin (Northside) Wastewater Treatment Plant (NC0023965) or the City of Wilmington's M'Kean Maffitt (Southside) Wastewater Treatment Plant (NC0023973) prior to being disposed into the receiving stream. This collection system permit shall be referenced upon renewal or modification of the NPDES permit for this facility.

2. The wastewater collection system shall be effectively managed, maintained and operated at all times so that there is no discharge to land or surface waters, nor any contamination of groundwater. In the event that the wastewater collection system fails to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective actions, including actions that may be required by the Division of Water Quality (Division), such as the construction of additional or replacement sewer lines and/or equipment.

The Director may take enforcement action against the Permittee for sanitary sewer system discharges that must be reported to the Division as stipulated in Condition IV(2). This includes discharges that were caused by severe natural conditions or exceptional events **unless** the Permittee demonstrates through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. The discharge was caused by severe natural conditions; there were no feasible alternatives to the discharge, such as the use of auxiliary treatment facilities, retention of untreated wastewater, reduction of inflow and infiltration, use of adequate back-up equipment, or an increase in the capacity of the system. This provision is not satisfied if, in the exercise of reasonable engineering judgment, the Permittee should have installed auxiliary or additional collection system components, wastewater retention or treatment facilities, adequate back-up equipment or should have reduced inflow and infiltration; or

b. the discharge was exceptional, unintentional, temporary and caused by factors beyond the reasonable control of the Permittee; the discharge could not have been prevented by the exercise of reasonable control, such as proper management, operation and maintenance; adequate treatment facilities or collection system facilities or components (e.g., adequately enlarging treatment or collection facilities to accommodate growth or adequately controlling and preventing infiltration and inflow); preventive maintenance; or installation of adequate back-up equipment;

The Permittee can submit a claim to the Division Regional Office that the discharge meets the criteria of this condition. The Permittee has the option of submitting this claim along with the report required by Condition IV(2) (i.e., within five working days), but in all viable instances, the claim should be submitted to the appropriate Division Regional Office within 10 working days (i.e., Monday through Friday, excluding State holidays) of the date of the discharge in order to be considered for immunity from enforcement action. The Permittee has the burden of proof that the above criteria have been met.

It is the Division's understanding that the two pump stations known by the identifiers COW No. 34 and COW No. 35 are jointly operated and maintained by both the Permittee and New Hanover County. The Permittee is responsible for the operation and maintenance of the pump stations as well as for the operation and maintenance of the screening and grit removal equipment at COW No. 34. New Hanover County is responsible for the operation and maintenance of the screening and grit removal equipment at COW No. 35. Therefore, the Permittee shall be responsible for those discharges associated with COW No. 35 following its influent structure only. Discharges resulting from the failure to operate and maintain the screening and grit removal equipment at COW No. 35 properly shall be the responsibility of New Hanover County, as established under its individual system-wide wastewater collection system permit issued by the Division. Likewise, any discharge associated with COW No. 34 shall be the sole responsibility of the Permittee. Should the Director be unable to determine exact responsibility for a discharge at either of these pump stations, enforcement action may be taken against both the Permittee and New Hanover County.

3. The Permittee shall have the legal authority to implement the requirements of Condition I(4), require new sewers be properly constructed, ensure proper inspection and testing of sewers and laterals, and address flows from satellite systems.

4. The Permittee shall maintain an educational and enforcement program that requires the proper operation and maintenance of all grease traps and septic tanks connected to the wastewater collection system. The educational program shall target both residential and commercial users.

5. The Permittee shall implement a Capital Improvement Plan (CIP) to designate funding for reinvestment into the wastewater collection system infrastructure. The CIP shall address short-term needs and long-term "master plan" concepts.

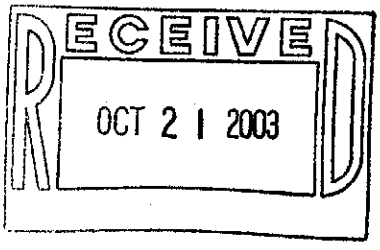
Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E., Director
Coleen H. Sullins, Deputy Director
Division of Water Quality

October 17, 2003

Hugh T. Caldwell, Public Utilities Director
City of Wilmington
Post Office Box 1810
Wilmington, NC 28402



Subject: Administrative Amendment
Permit No. WQCS00012
City of Wilmington
Wilmington Wastewater Collection System
New Hanover County

Dear Mr. Caldwell:

The Division of Water Quality (DWQ) has revised the procedures for enforcement of sanitary sewer overflows (SSOs) and the reporting of those overflows to the Division. As you are aware, issuance of the subject system-wide collection system permit for your facility on July 18, 2001 superceded the Division's 1999 Enforcement Policy. The evaluation of enforcement options after a sanitary sewer overflow will be determined considering the criteria listed in condition I(2)(a) and I(2)(b) of your permit. Compliance with all conditions of the permit as well as all statutes and regulations pertaining to the collection system must be maintained or appropriate enforcement actions may be taken as noted in Condition VI(3).

A reportable SSO is a SSO greater than 1,000 gallons to the ground or a SSO of any amount that reaches surface water (including through ditches, storm drains, etc.) Below is the procedure to use for reporting SSOs to the Division:

1. Report by telephone to a person (not facsimile or voicemail) to your regional DWQ office during regular business hours (Monday to Friday, 8AM to 5PM) as soon as possible, but in no case more than 24 hours after the SSO is known or discovered. To report outside of regular business hours, call (800) 858-0368.

2. Follow up the verbal report by sending a completed written report on the most current Division approved form within five days.

To provide a uniform method for all systems covered under this permit to provide useful and consistent information pertaining to SSOs, a new spill reporting form has been developed. Enclosed you will find Form CS-SSO, which consists of two parts. Part I serves to provide to the Division the required information that has always been necessary. Part II serves as an area to provide a justification for the spill, as optional under Condition I(2) of your permit.

An NOV, civil penalty, and/or a moratorium on the addition of waste to the system may be issued if adequate justification for an SSO is NOT submitted to the regional office. In order to submit a claim for justification of an SSO, you must use the attached form with additional documentation as necessary. DWQ staff will review the justification claim and determine if enforcement action is appropriate. Please review the attached form and be advised that the information needed to justify a spill is very comprehensive. Begin using this form immediately to report SSOs from the collection system. Continue to use our old form for reporting bypasses at the wastewater treatment plant until further notice. The time frame for submittal of both Part I and Part II, if pertinent, is five days.

Currently, your permit allows for ten days to submit the justification claim. Because Form CS-SSO has incorporated space to provide a justification along with the required spill report, your permit has been amended to reflect that all written documentation pertaining to an SSO is to be submitted within five days. This change is reflected in Condition I(2). Per General Statute 143-215.1(b)(4)(c), you have sixty days to appeal this amendment. Additionally, some minor modifications to Condition IV(2) have been made. The highway patrol 800 number has been removed, clarification has been made to the verbal reporting requirements (i.e. no facimilies or voice mails) and we have referenced the new form. Spill reporting should be made to the appropriate regional office during business hours or to the emergency management number identified in the permit after hours.

In accordance with this administrative amendment directed on October 7, 2003, we are forwarding herewith Permit No. WQCS00012 (without original attachments), dated October 17, 2003, to the City of Wilmington for the operation and maintenance of the subject wastewater collection system.

This permit shall be effective **sixty days** from the date of receipt until June 30, 2006 and shall void Permit No. WQCS00012 issued July 18, 2001. This comprehensive collection system permit includes conditions which cover all of the Spill Response and Operation and Maintenance Evaluation Factors in the Updated Collection System Enforcement Guidance issued June 14, 1999. As mentioned, **this permit supercedes the 1999 point system** used to determine enforcement options for sanitary sewer overflows. The evaluation of enforcement options after a sanitary sewer overflow will be determined considering the criteria listed in condition I(2)(a) and I(2)(b) of the permit. Compliance with all conditions of the permit must be maintained or appropriate enforcement actions may be taken as noted in Condition VI(3).

This permit shall be subject to the conditions and limitations specified herein. It is your responsibility to thoroughly review this permit. Please pay particular attention to the monitoring and reporting requirements in this permit and any compliance schedules shown in **bold**.

Failure to abide by the conditions in this permit may subject the Permittee to enforcement action. If any parts, requirements, or limitations contained in this permit are unacceptable, you have the right to request an adjudicatory hearing upon written request within thirty days following the receipt of this permit. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27699-6714. Unless such demands are made, this permit shall be final and binding.

The Division is also pursuing a way to provide an Internet based electronic submittal of SSO reports. Enclosed is a User Identifier/Password Request Form. In preparation for this service, please complete the enclosed form and return it to the address provided on the form by November 30, 2003. The Division will be contacting those who submit this form to provide the login site and your specific login ID and password. We anticipate early 2004 to implement on-line submittal of 5-day SSO reports. Until then, hard copies must be submitted as currently practiced. Initally, this service will roll out only for SSO written 5-day reports and then expand to bypass reporting and other types of spills.

Please ensure all collection system staff receive this notice! This permit should replace your original permit with exception of any attachment(s), which should be transferred and attached to this permit. Now is a good time to again thoroughly review your permit. Ensure any expired compliance dates have been met and the regional office has been notified of your compliance with those conditions.

If you have questions regarding the new enforcement policy or to download Form CS-SSO, please contact your regional office or go to http://h2o.enr.state.nc.us/ndceu/Collection.htm. You may also contact Daryl Merritt at (919)733-5083, ext. 539 or via E-mail at daryl.merritt@ncmail.net or Linda Fitzpatrick at (919)733-5083, ext. 526 or via E-mail at linda.fitzpatrick@ncmail.net. For questions pertaining to your permit, please contact Marie Doklovic at (919) 733-5083, ext. 371 or via E-mail at marie.doklovic@ncmail.net.

Sincerely,

Alan Klimek

Alan W. Klimek, P.E.

Enclosures:

Form CS-SSO
User Identifier/Password Request Form
Amended Permit No. WQCS00012 (w/o original attachments)

Cc (permit only):

Mr. William T. Justice, Jr. (ORC), City of Wilmington
Mr. Richard S. Fasnacht (Back-Up ORC), City of Wilmington
Mr. Kenneth L. Vogt, Jr. (Back-Up ORC), City of Wilmington
New Hanover County Health Department
Wilmington Regional Office, Water Quality Section
Technical Assistance and Certification Unit
NDPU File WQCS00012

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

RALEIGH

SYSTEM-WIDE WASTEWATER COLLECTION SYSTEM PERMIT

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations

PERMISSION IS HEREBY GRANTED TO

City of Wilmington

New Hanover County

FOR THE

operation and maintenance of a wastewater collection system consisting of approximately 370 miles of gravity sewer; approximately 25 miles of force main; less than one mile of pressure sewer, 28 pump stations with pump reliability that serve more than one building; one pump station, excluding the screening and grit removal equipment (i.e., part of the New Hanover County Wastewater Collection System), with pump reliability that serve more than one building; one simplex pump station that discharges to a pressure sewer and serves more than one building; two simplex pump stations that discharge to a pressure sewer and serve a single building; and all associated piping, valves, and appurtenances required to make a complete and operational wastewater collection system to serve the City of Wilmington, any deemed permitted satellite wastewater collection systems, and the following tributary satellite wastewater collection systems that are subject to an individual permit: New Hanover County Wastewater Collection System and Wrightsville Beach Wastewater Collection System. The above-described wastewater collection system shall be pursuant to the application received on January 18, 2001 and the additional information received on May 17, 2001; June 14, 2001; June 27, 2001; and June 28, 2001 as well as in conformity with the documents referenced therein and other supporting data subsequently filed and approved by the Department of Environment and Natural Resources and considered a part of this permit.

This permit shall be effective from the date of issuance until June 30, 2006, shall void Permit No. WQCS00012 issued July 18, 2001 and shall be subject to the following specified conditions and limitations:

I. PERFORMANCE STANDARDS

1. The sewage and wastewater collected by this system shall be treated in either the City of Wilmington's James A. Loughlin (Northside) Wastewater Treatment Plant (NC0023965) or the City of Wilmington's M'Kean Maffitt (Southside) Wastewater Treatment Plant (NC0023973) prior to being disposed into the receiving stream. This collection system permit shall be referenced upon renewal or modification of the NPDES permit for this facility.

2. The wastewater collection system shall be effectively managed, maintained and operated at all times so that there is no discharge to land or surface waters, nor any contamination of groundwater. In the event that the wastewater collection system fails to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective actions, including actions that may be required by the Division of Water Quality (Division), such as the construction of additional or replacement sewer lines and/or equipment.

   The Director may take enforcement action against the Permittee for sanitary sewer system discharges that must be reported to the Division as stipulated in Condition IV(2). This includes discharges that were caused by severe natural conditions or exceptional events **unless** the Permittee demonstrates through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. The discharge was caused by severe natural conditions; there were no feasible alternatives to the discharge, such as the use of auxiliary treatment facilities, retention of untreated wastewater, reduction of inflow and infiltration, use of adequate back-up equipment, or an increase in the capacity of the system. This provision is not satisfied if, in the exercise of reasonable engineering judgment, the Permittee should have installed auxiliary or additional collection system components, wastewater retention or treatment facilities, adequate back-up equipment or should have reduced inflow and infiltration; or

   b. the discharge was exceptional, unintentional, temporary and caused by factors beyond the reasonable control of the Permittee; the discharge could not have been prevented by the exercise of reasonable control, such as proper management, operation and maintenance; adequate treatment facilities or collection system facilities or components (e.g., adequately enlarging treatment or collection facilities to accommodate growth or adequately controlling and preventing infiltration and inflow); preventive maintenance; or installation of adequate back-up equipment;

   The Permittee can submit a claim to the Division Regional Office that the discharge meets the criteria of this condition. The Permittee has the option of submitting this claim along with the spill report required by Condition IV(2) (i.e., within five days) in order to be considered for immunity from enforcement action. Form CS-SSO Part II, or most current Division approved form, shall be used for any claims. The Permittee has the burden of proof that the above criteria have been met.

   It is the Division's understanding that the two pump stations known by the identifiers COW No. 34 and COW No. 35 are jointly operated and maintained by both the Permittee and New Hanover County. The Permittee is responsible for the operation and maintenance of the pump stations as well as for the operation and maintenance of the screening and grit removal equipment at COW No. 34. New Hanover County is responsible for the operation and maintenance of the screening and grit removal equipment at COW No. 35. Therefore, the Permittee shall be responsible for those discharges associated with COW No. 35 following its influent structure only. Discharges resulting from the failure to operate and maintain the screening and grit removal equipment at COW No. 35 properly shall be the responsibility of New Hanover County, as established under its individual system-wide wastewater collection system permit issued by the Division. Likewise, any discharge associated with COW No. 34 shall be the sole responsibility of the Permittee. Should the Director be unable to determine exact responsibility for a discharge at either of these pump stations, enforcement action may be taken against both the Permittee and New Hanover County.

3. The Permittee shall have the legal authority to implement the requirements of Condition I(4), require new sewers be properly constructed, ensure proper inspection and testing of sewers and laterals, and address flows from satellite systems.

4. The Permittee shall maintain an educational and enforcement program that requires the proper operation and maintenance of all grease traps and septic tanks connected to the wastewater collection system. The educational program shall target both residential and commercial users.

5. The Permittee shall implement a Capital Improvement Plan (CIP) to designate funding for reinvestment into the wastewater collection system infrastructure. The CIP shall address short-term needs and long-term "master plan" concepts.

6. Existing overflow piping from manholes and pump stations, excluding piping to approved equalization structures, shall be immediately removed or permanently capped. Plugged emergency pumping connections shall be allowable for portable pumping or rerouting without intentionally bypassing the wastewater treatment facility.

7. The Permittee shall maintain a contingency plan for pump failure at each pump station. If one of the pumps in a pump station containing multiple pumps fails, the process of repairing or replacing the pump shall be initiated immediately and the new parts or pump shall be installed as soon as possible. If the pump in a simplex pump station or a pump station not capable of pumping at a rate of 2.5 times the average daily flow rate fails, it shall be replaced, fixed or otherwise corrected immediately.

8. Each pump station shall be clearly and conspicuously posted with a pump station identifier and an emergency contact telephone number through which an individual who can initiate or perform emergency service for the wastewater collection system 24 hours per day, seven days per week can be contacted. Existing signs, when replaced, and new signs shall include language that couples the emergency contact telephone number with instructions for any one to call if the visual alarm illuminates, if the audible alarm sounds, or if an emergency situation is apparent.

9. Pump station sites, equipment, and components shall have restricted access, per 15A NCAC 2H .0219(h)(7).

10. Pump stations that do not employ an automatic polling feature (i.e., routine contact with pump stations from a central location to check operational status of the communication system) shall have both audible and visual high-water alarms. The alarms shall be weatherproof and placed in a clear and conspicuous location. Permits issued for the construction of pump stations that included high-water alarms in the description shall maintain the alarms even if simple telemetry (i.e., notification of an alarm condition initiated by the pump station control feature) is installed.

11. For all newly constructed, modified, and rehabilitated pump stations, equipment and components located within the pump station shall be corrosion resistant, and components in close proximity of the pump station shall be sealed within a corrosion-resistant coating or encasement.

12. All construction and rehabilitation of the wastewater collection system (i.e., permitted or deemed permitted) shall be scheduled so as to minimize the interruption of service by the existing utilities. Construction and rehabilitation shall not result in the violation of Condition I. 2. of this permit.

II. OPERATION AND MAINTENANCE REQUIREMENTS

1. Upon classification of the system by the Water Pollution Control System Operators Certification Commission (WPCSOCC), the Permittee shall designate a certified wastewater collection system operator to be the Operator in Responsible Charge (ORC) of the wastewater collection system. The operator shall hold a valid certificate of the type and grade at least equivalent to or greater than the classification assigned to the wastewater collection system by the WPCSOCC. The Permittee shall also designate one or more Back-Up ORC(s) who possess(es) a valid certificate of the type and grade of the system that is no more than one grade less than the grade of the system. The ORC of the system shall visit the system within 24 hours of knowledge of a bypass, spill, or overflow of wastewater from the system, unless visited by the Back-Up ORC, and shall comply with all other conditions of 15A NCAC 8G .0204.

2. The Permittee shall develop and maintain a schedule for reviewing all inspection, maintenance, operational and complaint logs. Once recurring problems are identified in the wastewater collection system as a result of the review process, the Permittee shall establish a plan for addressing the problem(s) if they can not be resolved in a short time period. The Permittee shall define and adhere to a review period.

3. The Permittee shall develop and maintain a schedule for testing emergency and stand-by equipment.

4. The Permittee shall develop and conduct a routine pump station inspection and maintenance program, which shall include, but not be limited to, the following maintenance activities:

    1. Cleaning and removing debris from the pump station structure, outside perimeter, and wet well;
    2. Inspecting and exercising all valves;
    3. Inspecting and lubricating pumps and other mechanical equipment according to the manufacturer's recommendations; and
    4. Verifying the proper operation of the alarms, telemetry system and auxiliary equipment.

5. For each pump station without pump reliability (i.e. simplex pump stations serving more than a single building or pump stations not capable of pumping at a rate of 2.5 times the average daily flow rate with the largest pump out of service), at least one fully operational spare pump capable of pumping peak flow shall be maintained on hand.

6. The Permittee shall maintain on hand at least two percent of the number of pumps installed, but no less than two pumps, that discharge to a pressure sewer and serve a single building, unless the Permittee has the ability to purchase and install a replacement pump within 24 hours of first knowledge of the simplex pump failure or within the storage capacity provided in any sewer line extension permit.

7. Rights-of-way shall be properly maintained to allow accessibility to the wastewater collection system.

8. The Permittee shall assess cleaning needs and develop and maintain a program for appropriately cleaning, whether by hydraulic or mechanical methods, all sewer lines. At least 10 percent of the wastewater collection system, selected at the discretion of the ORC, shall be cleaned each year. Preventative cleaning is not required for sewer lines less than five years old unless inspection otherwise reveals a necessity or as required by a sewer line extension permit.

9. Adequate measures shall be taken to contain Sanitary Sewer Overflows (SSOs) and spills. The Permittee shall maintain a Response Action Plan that addresses the following minimum items:

   a. Contact phone numbers for 24-hour response, including weekends and holidays;

   b. Response time;

   c. Equipment list and spare parts inventory;

   d. Access to cleaning equipment;

   e. Access to construction crews, contractors and/or engineers;

   f. Source(s) of emergency funds;

   g. Site sanitation and clean up materials; and

   h. Post-overflow/spill assessment.

10. The Permittee shall conduct an on-site evaluation for all SSOs and spills as soon as possible, but no more than two hours after first knowledge of the overflow and/or spill.

11. In the event of a discharge from or blockage within the wastewater collection system, the Permittee shall restore the system operation, remove visible solids and paper, sanitize any ground area and restore the surroundings.

III. RECORDS

1. Records shall be maintained to document compliance with Condition I. 4., Conditions II. 2. through II. 4., Conditions II. 7. through II. 8., Condition IV. 3., and Conditions V. 1. through V. 4. Records must be kept on file for a minimum of three years.

2. Adequate records pertaining to SSOs, spills, and complaints shall be maintained by the Permittee for a minimum of three years. These records shall include, but are not limited to, the following information:
   a. Date of overflow and/or spill or complaint;
   b. Volume of wastewater discharged as a result of the overflow and/or spill or nature of complaint;
   c. Location of overflow and/or spill or complaint;
   d. Estimated duration of the overflow and/or spill;
   e. Individual from the Division who was informed about the overflow and/or spill or complaint, when applicable;
   f. Final destination of the overflow and/or spill;
   g. Corrective actions;
   h. Known environmental/human health impacts resulting from the overflow and/or spill; and
   i. How the overflow and/or spill was discovered.

3. The Permittee shall maintain an up-to-date, accurate, comprehensive map of their wastewater collection system that also notes the locations where other wastewater collection systems become tributary. If a comprehensive map of the collection system has not been established, a rough sketch shall be drawn and the Permittee shall map approximately 10 percent of their collection system each year for the next 10 years, or until complete, whichever is sooner. The comprehensive map shall include, but is not limited to: pipe size, pipe material, pipe location, flow direction, approximate pipe age, number of active service taps, as well as each pump station's identification, location and capacity.

4. The Permittee shall maintain records of all of the modifications and extensions to the collection system permitted herein. A copy of the construction record drawings and specifications for modifications/extensions to the wastewater collection system shall be maintained on file by the Permittee for the life of the modification/extension and information concerning the extension shall be incorporated into the map of the wastewater collection system within one year of the completion of construction. The system description contained within this permit shall be updated to include this modification/extension information upon permit renewal.

IV. MONITORING AND REPORTING REQUIREMENTS

1. Any monitoring (i.e., including wastewater flow, groundwater, surface water, soil or plant tissue analyses) deemed necessary by the Division to ensure surface water and groundwater protection shall be established, and an acceptable sampling and reporting schedule shall be followed.

2. The Permittee shall verbally report to a person at the Wilmington Regional Office, at telephone number 910-395-3900 as soon as possible, but in no case more than 24 hours following the occurrence or first knowledge of the occurrence of either of the following:

   a. Any SSO and/or spill over 1,000 gallons; or
   b. Any SSO and/or spill, regardless of volume, that reaches surface water.

   Voice mail messages or faxed information is permissible but this shall not be considered as the initial verbal report. Overflows and spills occurring outside normal business hours may also be reported to the Division of Emergency Management at telephone number (800) 858-0368 or (919) 733-3300. Persons reporting any of the above occurrences shall file a spill report by completing Part I of Form CS-SSO (or the most current Division approved form), within five days following first knowledge of the occurrence. This report shall outline the actions taken or proposed to ensure that the problem does not recur. Per Condition I(2), Part II of Form CS-SSO (or the most current Division approved form) can also be completed to show that the SSO was beyond control.

3. The Permittee shall meet the annual reporting and notification requirements provided in North Carolina General Statute §143-215.1C.

V. INSPECTIONS

1. The Permittee or the Permittee's designee shall inspect the wastewater collection system regularly to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes to the environment, a threat to human health, or a nuisance. The Permittee shall keep an inspection log or summary including at least the date and time of inspection, observations made, and any maintenance, repairs, or corrective actions taken by the Permittee. This log of inspections shall be maintained by the Permittee for a period of at least three years from the date of the inspection and shall be made available upon request to the Division or other permitting authority.

2. Pump stations without Supervisory Control and Data Acquisition (SCADA) systems or telemetry shall be inspected daily as defined in 15A NCAC 2B.0503(5) until July 1, 2001 and, thereafter, every day. Pump stations equipped with SCADA systems or telemetry shall be inspected at least once per week.

3. A general observation of the entire collection system shall be performed throughout the course of every year.

4. Inspections of all high-priority lines (i.e., aerial lines, sub-waterway crossings, siphons, lines contacting surface water, lines running parallel to streambanks that are subject to erosion which may threaten the sewer line, and any other segment of the wastewater collection system that is designated as high-priority line in a permit) shall be performed at least once every six months. High-priority lines that are subject to the requirements of this condition as of this permit's issuance date is presented in Attachment A.

VI. GENERAL CONDITIONS

1. This permit shall become voidable unless the wastewater collection system is maintained and operated in accordance with the conditions of this permit and other supporting data.

2. This permit shall not be transferable. In the event there is a desire for the wastewater collection system to change ownership, or there is a name change of the Permittee, a formal permit request shall be submitted to the Division accompanied by documentation from the parties involved and other supporting materials as may be appropriate. The approval of this request shall be considered on its merits and may or may not be approved.

3. Failure to abide by the conditions and limitations contained in this permit may subject the Permittee to an enforcement action by the Division in accordance with North Carolina General Statutes §143-215.6A through §143-215.6C, and a sewer moratorium may be established.

4. The issuance of this permit shall not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e., local, state, and federal) having jurisdiction, including but not limited to applicable river buffer rules in 15A NCAC 2B .0200, soil erosion and sedimentation control requirements in 15A NCAC Ch. 4 and under the Division's General Permit NCG010000, any requirements pertaining to wetlands under 15A NCAC 2B .0200 and 15A NCAC 2H .0500, and all applicable North Carolina Occupational Safety and Health Act health and safety standards.

5. The issuance of this permit shall not prohibit the Division from reopening and modifying the permit, revoking and reissuing the permit, or terminating the permit as allowed by the laws, rules, and regulations contained in 15A NCAC 2H .0200 and North Carolina General Statute §143-215.1 et al. or as needed to address changes in federal regulations with respect to the wastewater collection system.

6. The Permittee shall pay the annual fee within 30 days after being billed by the Division. Failure to pay the fee accordingly may cause the Division to initiate action to revoke this permit as specified by 15A NCAC 2H .0205(c)(4).

7. The Permittee shall request its renewal at least six months prior to the expiration of this permit. Upon receipt of the request, the Division shall review the adequacy of the wastewater collection system described therein, and if warranted, shall extend the permit for a period of time and under such conditions and limitations, as the Division may deem appropriate.

8. The Permittee shall notify the Division's Non-Discharge Permitting Unit in writing at 1617 Mail Service Center, Raleigh, North Carolina 27699-1617 of any changes to the name and/or address of the responsible party (i.e. mayor, manager) of the wastewater collection system.

9. Any duly authorized officer, employee, or representative of the Division may, upon presentation of credentials, enter and inspect any property, premises or place on or related to the collection system at any reasonable time for the purpose of determining compliance with this permit, may inspect or copy any records that must be maintained under the terms and conditions of this permit, and may obtain samples of wastewater, groundwater, surface water, soil, or plant tissue.

Permit issued this the 17th day of October, 2003

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Alan Klimek

Alan W. Klimek, P.E., Director
Division of Water Quality
By Authority of the Environmental Management Commission

Permit Number WQCS00012

ATTACHMENT A

High-Priority Lines Subject to the Requirements of Condition V. 4. (As of July 18, 2001)

1. Burnt Mill Creek Outfall
2. East Lakeshore Drive and Lake Branch Drive
3. Greenfield Lake Crossing
4. Hewlett's Creek Outfall
5. Hunters Trail
6. Jump'n Run Creek
7. Love Grove Outfall
8. Maides Park Outfall
9. McCumbers Ditch
10. Mineral Springs Outfall
11. North Side Discharge Line
12. North 6th Street and Compton Street (High-priority line will be relocated as part of the Smith Creek Parkway project)
13. North 23rd Street Crossing
14. Parmele Street
15. Smith Creek Outfall
16. South 13th Street and Lakeshore Drive
17. Wellington Outfall

Appendix B

CHAPTER VI: WATER AND SANITARY SEWER FEE SCHEDULE

ARTICLE A. WATER SERVICE FEE SCHEDULE

Section 1. Basic Water Rates

The basic bimonthly water rates for all customers with water service provided through each cubic foot meter shall be as follows:

Water Consumption Per Meter (Two Months)	Water Charges Per 100 Cubic Feet*
0 – 6,000	$1.68
6,001 – 75,000	1.52
over 75,000	1.26

*100 Cubic Feet = approximately 750 gallons

The basic monthly water rates for all groundwater customers with water service provided through each gallon meter shall be as follows:

Water Consumption Per Meter (Month)	Water Charges Per 1,000 Gallons
0 – 45,000	$2.25
45,001 – 562,500	2.02
over 562,500	1.68

Within thirty (30) days after receipt of a notification from the City, the owner, firm or corporation responsible for paying water charges to a multiple family account as described above shall certify in writing the number of permanent dwelling units served by the account. If the owner, firm, or corporation fails to provide such certification within the time required, the City shall bill all water use to that account at the maximum rate provided in the table above that is effective on the date of each bill until such certification is made.

Households with annual incomes within the eligibility limit set forth in the N. C. G. S. 105-277.1, and whose head is sixty-five (65) years of age or older or totally and permanently disabled, shall receive a credit against bimonthly charges in an amount equal to two hundred (200) cubic feet of water and one month's minimum charge ($4.40) as provided in Section 2. The credit shall be funded by a payment from the General Fund to the Utility Fund.

Section 2. Minimum Bimonthly Water Charges

Minimum bimonthly water charges shall apply to all users of City of Wilmington public water for the duration of use. Such charges shall be payable in advance, based on meter size as follows:

Meter Size (Inches)	Monthly Minimum	Bimonthly Minimum
5/8	$ 4.40	$ 8.80
¾	$ 4.40	$ 8.80
1	$ 11.00	$ 22.00
1 ½	$ 22.00	$ 44.00
2	$ 35.00	$ 70.00
3	$ 71.00	$ 142.00
4	$110.00	$ 220.00
6	$221.00	$ 442.00
8	$353.00	$ 705.00
10	$551.00	$1,102.00

Section 3. Fire Line Connection Charges

The following bimonthly charges shall be applied in accordance with the size of connection for a private fire line with hydrant or City water connection to a fire line inside a building:

Size of Connection	Bimonthly Charge	Annual Charge
4-inch	$ 40.00	$ 240.00
6-inch	$ 80.00	$ 480.00
8-inch	$140.00	$ 840.00
10-inch	$220.00	$1320.00
12-inch	$320.00	$1920.00

All fire line connection charges will be billed bimonthly and shall be paid in advance.

Section 4. Water Service Connection Fees

Where the City installs a water service connection for a customer, the following charges shall apply:

Size	Service Line Fees	Meter Fees	Total
¾ inch	$1,350	$ 80	$1,430
1-inch	1,500	120	1,620
1 ½ inch	1,900	245	2,145
2-inch	2,450	280	2,730

Where the City installs water service connection for a group of individuals who apply through the neighborhood service connection program, the following charges shall apply to each residence:

Size	Total Charge
¾ inch	$1,295
1 inch	$1,470
1 ½ inch	$1,955

Households with annual incomes within the eligibility limit set forth in the N. C. G. S. 105-277.1, and whose head is sixty-five (65) years of age or older or totally and permanently disabled, whose water service has been provided through the neighborhood service connection program, shall pay a fee of $1,000 for a ¾" service.

Where the City installs a manifold assembly water service connection for a customer the following charges shall apply:

3/4" Manifold Assembly

Line Size	Service Line Fee	Manifold Assembly Fee	Meters Qty.	Meter Fee	Total
1 inch	$1,400	$ 200	2	$ 160	$1,760
1 ½ inch	1,800	300	3	240	2,340
1 ½ inch	1,800	400	4	320	2,520
1 ½ inch	1,800	500	5	400	2,700
1 ½ inch	1,800	600	6	480	2,880
1 ½ inch	1,800	700	7	560	3,060
1 ½ inch	1,800	800	8	640	3,240
1 ½ inch	1,800	900	9	720	3,420
1 ½ inch	1,800	1,000	10	800	3,600
2 inch	2,350	1,100	11	880	4,330
2 inch	2,350	1,200	12	960	4,510
2 inch	2,350	1,300	13	1,040	4,690
2 inch	2,350	1,400	14	1,120	4,870
2 inch	2,350	1,500	15	1,200	5,050
2 inch	2,350	1,600	16	1,280	5,230

1" Manifold Assembly

Line Size	Service Line Fee	Manifold Assembly Fee	Meters Qty.	Meter Fee	Total
1 ½ inch	1,800	200	2	240	2,240
2 inch	2,350	300	3	360	3,010
2 inch	2,350	400	4	480	3,230
2 inch	2,350	500	5	600	3,450

Customers who apply for both water and sewer services at the same address shall receive a ten-percent (10%) discount off their water service connection charges.

A discount in the connection fees may also be granted to customers inside the City limits if service connections made in bulk as part of a City-initiated service extension result in lower construction costs.

When the City is only required to provide a tap or set a water meter and inspect the installation for a customer, the following charges shall apply:

Size	Tap Fees	Meter Fees	Total
¾ inch	$ 90	$ 80	$170

1-inch	$100	$120	$220
1 ½ inch	$120	$245	$365
2-inch	$140	$280	$420

For a water connection of larger than a two-inch size, the customer shall pay a connection fee determined by the City prior to installation which shall be based upon a detailed estimate the cost of the services and materials provided by the City for the facilities. This fee shall be the total amount to be paid by the customer to the City. The detailed estimate shall quantify all materials needed, including but not limited to pipes, valves, sleeves, meters, meter boxes or vaults, valve boxes, marl, and asphalt, each assigned the same unit prices as the City currently pays at the time of the estimate for the materials. The estimate shall further quantify a reasonable estimate of labor time required at hourly rates and benefits to be paid each employee and equipment time at hourly rates assigned each type of equipment on the same basis that the Streets Division of the Public Services Department assigns hourly rates for Powell Bill reporting. If the City elects to contract any of the installation work, the contractor's fee shall become part of the estimate.

When a customer who has received a prior connection requests a change in the size of water service provided to the same location, the customer shall make application to the City for the size of service desired and pay the tap and connection fees for the new service. The City shall then install the new service. The City shall remove the existing water service from the water main if it has been determined that the existing service will not be utilized in the future.

Where City installs the water service connection, the City may accept an application for water connection to a residential lot in the name of the owner occupying the home on the lot when water to be received is only for domestic use. The water connection fee shall become payable after the service has been installed and shall be due in equal bimonthly installments over a total period not to exceed sixty (60) months. All unpaid balances will be charged interest from the date of application or the date of completed installation, whichever is later, at the rate of four (4) percent per year.

Households with annual incomes within the eligibility limit set forth in the N. C. G. S. 105-277.1, and whose head is sixty-five (65) years of age or older or totally and permanently disabled will be charged interest at the rate of zero (0) percent per year.

In the event an owner sells the home for which the City has offered a payment plan while installments are still due, such owner shall pay the balance of the water connection fee plus interest accrued to that date in full within ten (10) days after the sale is closed. Failure to meet the conditions set forth in this paragraph shall subject the owner to penalties provided by Section 12-2 of the City Code.

The City shall not accept an application for water service connection from any applicant other than an owner occupant for residential use until the connection fees stated in this section are paid to the City in full, or in the case of connections greater than 2-inch in size, until 100% of the estimated cost is deposited.

"In the event that an owner fails to make application for connection after being notified as set forth in Section 12-12 of the City Code and the cost of connection becomes a lien on the property, the connection fees shall bear interest at the rate of eight percent per year or the legal rate of interest whichever is the lower rate of interest."

Section 5. Developer Main Extension Charge

All connections, except for the exemption listed below, to a water main extension included in an active reimbursement contract executed pursuant to Article IV, Section 12-179 (d) of the Wilmington City Code shall be charged a Developer Main Extension Charge of $27.00 per front foot of property abutting the water main extension. This charge shall only apply to connections to a water main extension included in an active reimbursement contract.

There shall be an exemption from the developer main extension charge for properties meeting all of the following criteria:

(1) The boundaries of the property, as recorded in the Office of the Register of Deeds, have not been altered after the execution date of the reimbursement contract.

(2) The size of the water service connection to the property does not exceed 1" in diameter.

(3) The water service connection to the property will serve a single-family residential dwelling or residential duplex.

Additional lots created by the subdivision of a property previously determined to be exempt (in accordance with the criteria listed above) from the developer main extension charge shall be liable for all applicable developer main extension charges.

Section 6. Fees For Special Use of Water

Water received for private use from a public hydrant, or an existing connection to the public water distribution system which is generally designated for public use, shall constitute the special use of water.

All water received as a special use will be through a hydrant meter and backflow prevention device supplied by the applicant and approved by the City. All water received for special use shall be charged a flat rate of one dollar and sixty cents ($1.60) per one hundred (100) cubic feet, or any part thereof.

In cases where the meter is stolen or stopped through normal malfunctions a valid estimate of consumption will be determined by the City and charged at the same rate of one dollar and sixty cents ($1.60) per one hundred (100) cubic feet.

With each application, the applicant must pay a deposit as prescribed in Chapter 12, Section 12-35 of the City Code. The deposit shall be as follows:

Meter Size	Deposit
5/8	$ 31.00
¾	$ 35.00
1	$ 45.00
1 ½	$ 56.00
2	$ 96.00

3	$ 165.00
4	$ 254.00
6	$ 437.00
8	$ 666.00
10	$ 924.00
12	$1,202.00

If water is received as a special use through a City-provided hydrant meter and backflow device, the applicant shall be charged a flat rate of one dollar and sixty cents ($1.60) per one hundred (100) cubic feet, or any part thereof. In cases where the meter is stolen or stopped through normal malfunctions a valid estimate of consumption will be determined by the City and charged at the same rate of one dollar and sixty cents ($1.60) per one hundred (100) cubic feet. The applicant must pay a deposit of $500.00 for up to a 2" meter and $700.00 for larger than a 2" meter.

A meter rental fee of two dollars ($2.00) per week, or any portion thereof, will be assessed for each meter setting regardless of the size of the meter used.

A charge of thirty dollars, ($30.00) will be made to cover the costs of installation and removal of the meter and the operation of the hydrant. A like charge will be made each time the meter is relocated for the applicant. In cases where the volume of water can be predetermined, thereby eliminating the need of a meter, a charge of thirty dollars ($30.00) will be made for each location to cover the cost of installing a control valve and operating the hydrant.

Section 7. Charges To City General Fund-Public Fire Hydrants

A public fire hydrant capacity charge of one hundred seventeen dollars ($117.00) per annum per hydrant shall be charged against the City General Fund. Such charge shall be made monthly on the basis of the number of hydrants in operation or available for use at that time. The proceeds of this charge shall be paid into the City Public Utilities Fund.

Section 8. Basic Untreated Water Rates

The basic rate for consumption or use of untreated "raw" water both inside and outside the City limits shall be $0.54 per one thousand gallons. Untreated water includes all water transported to the customer by the City from any intake and pumping facility without purification at the Sweeney Water Treatment Plant.

Section 9.

The City may charge $50.00 for a second reinspection of backflow prevention assembly installations if the installation does not meet City Code requirements. The City may charge $100 for a third reinspection of the same assembly.

Section 10. Charges for Extension of Ground Water System to Developed Properties.

Each property owner applying for an extension of the ground water system to developed property in accordance with Section 12-178(d) of the City Code shall be charged $27.00 per front foot of property abutting the proposed water main extension.

ARTICLE B. SANITARY SEWER SERVICE FEE SCHEDULE

Section 1. Basic Sanitary Sewer Rates

The basic sanitary sewer rate for bimonthly billing for all users also receiving City of Wilmington public water shall be as follows:

Sewer Charge Per 100 Cubic Feet Metered Water Consumption
$2.47

Where sanitary sewer service is furnished and public water is not used, the Director of Public Utilities, at his discretion, may require the installation of a meter for actually measuring sewage flow. In such cases, the sanitary sewer charge shall be based on cubic feet of metered sewage flow at the effective rate as stated above.

Where sanitary sewer service is furnished, public water is not used, and the Director of Public Utilities does not require the installation of a meter for measuring sewage flow, a flat bimonthly sanitary sewer charge will be assessed at a rate of seventy dollars ($70.00) for a single-family housing unit and for each multiple-family housing unit.

Households with annual incomes within the eligibility limit set forth in the N. C. G. S. 105-277.1, and whose head is sixty-five (65) years of age of older or totally and permanently disabled, shall receive a credit against bimonthly sewer charges in an amount equal to two hundred (200) cubic feet of sewer and one month's minimum charge ($5.00) as provided in Section 2. The credit shall be funded by a payment from the General Fund to the Utility Fund.

Section 2. Minimum Bimonthly Sanitary Sewer Charges.

Minimum bimonthly sanitary sewer charges shall apply to all users of City of Wilmington sanitary sewer for the duration of use. As provided in Section 2 of Article A of this chapter, such charges shall be payable in advance, based on water meter size, as follows:

Meter Size (Inches)	Monthly Base Rate	Bimonthly Base Rate
5/8	$ 5.00	10.00
¾	$ 5.00	10.00
1	$ 12.50	25.00
1.5	$ 25.00	50.00
2	$ 40.00	80.00
3	$ 80.00	160.00
4	$124.75	249.50
6	$249.50	499.00
8	$399.00	798.00
10	$623.50	1,247.00

When sanitary sewer service is provided but public water service is not, the minimum charge shall be determined on the basis of the equivalent water meter size, which would be needed for the type of service to be provided to the property.

Section 3. Extra Strength Sanitary Sewer Discharges.

Standard wastewater strength shall be defined by the pollutant concentrations specified as follows:

BOD5	less than 200 mg/l
COD	less than 600 mg/l
Suspended Solids (SS)	less than 200 mg/l

When the discharge of wastewater into public sanitary sewer is permitted by the Director of Public Utilities in accordance with an Industrial Waste Discharge Permit of a strength exceeding standard wastewater strength, a surcharge shall be applied in addition to the basic user rates as follows:

1. BOD5
   (a) $23.00 per 100 lbs. by weight for concentrations in excess of 200 mg/1.

2. COD
   $23.00 per 100 lbs. by weight for concentrations in excess of 600 mg/l and is 3 times or more than the BOD5 value.

3. Suspended Solids
   (a) $11.00 per 100 lbs. by weight for concentrations in excess of 200 mg/1.

High concentrations of specific pollutants in industrial wastewater may warrant an industrial surcharge, when surcharge is based upon proven actual costs of the treatment of such wastewater as determined by the Director of Public Utilities.

Pounds shall be computed by 8.34, the weight of one gallon of water, times volume of wastewater in million gallons, times the parts per million in excess of standard strength.

Extra strength surcharges shall apply at the same rates to customers inside and outside City limits.

Section 4. Sanitary Sewer Service Connection Fees

Where the City installs a sanitary sewer service connection, the following charges shall apply:

Size of Sewer Service	Connection Fee
4 inch	$2,700.00
6 inch	$2,900.00

Where the City installs sewer service connections for a group of individuals who apply through the neighborhood service connection program, the following charges shall apply to each residence:

Size of Sewer Service	Total Charge
4 inch	$900.00
6 inch	$1100.00

Customers who apply for both water and sewer services at the same address shall receive a ten-percent (10%) discount off their sewer service connection charges.

When a utility contractor approved by the City installs the sewer service tap and connection and the City inspects the installation, the following charges shall apply:

Size of Sewer Service	Connection Fee
4 inch	$30.00
6 inch	$30.00

For sanitary sewer connections of larger than a 6-inch size, the customer shall pay a connection fee determined by the City prior to installation, which shall be based upon a detailed estimate of the cost of the services and materials provided by the City for the facilities. This fee shall be the total amount to be paid by the customer to the City. The detailed estimate shall quantify all materials needed, including but not limited to pipes, clean-outs and clean-out boxes, pumping units, marl, and asphalt, each assigned the same unit prices as the City currently pays at the time of the estimate for the materials. The estimate shall further quantify a reasonable estimate of labor time required at hourly rates and benefits to be paid each employee and equipment time at hourly rates assigned each type of equipment on the same basis that the Streets Division of the Public Services Department assigns hourly rates for Powell Bill reporting. If the City elects to contract any of the installation of the work, the contractor's fee shall become part of the estimate.

When a customer who has received a prior connection requests a change in the size of sewer service provided to the same location, the customer shall make application to the City for the size of service desired and pay the applicable fee for a new connection. The City shall then install the new service. The City shall remove the existing sewer service from the sewer main if it has been determined that the existing service will not be utilized in the future.

Where City installs the sewer service connection, the City may accept an application for sewer connection to a residential lot in the name of the owner occupying the home on the lot when sewer to be discharged is only from domestic use. The sewer connection fee shall become payable after the service has been installed and shall be due in equal bimonthly installments over a total period not to exceed sixty (60) months. All unpaid balances will be charged interest from the date of application or the date of completed installation, whichever is later, at the rate of four (4) percent per year.

Households with annual incomes within the eligibility limit set forth in the N. C. G. S. 105-277.1, and whose head is sixty-five (65) years of age or older or are totally and permanently disabled, will be charged interest at the rate of zero (0) percent per year.

In the event an owner sells the home for which the City has offered a payment plan while installments are still due, such owner shall pay the balance of the sanitary sewer connection fee plus interest accrued to that date in full within ten (10) days after the sale is closed. Failure to meet the conditions set forth in this paragraph shall subject the owner to penalties provided by Section 12-2 of the City Code.

The City shall not accept an application for sanitary sewer service connection from any applicant other than an owner occupant for residential use until the connection fees stated in this section are paid to the City in full, or in the case of connections greater than 6-inch in size, until 100% of the estimated cost is deposited.

"In the event that an owner fails to make application for connection after being notified as set forth in Section 12-12 of the City Code and the cost of connection becomes a lien on the property, the connection fees shall bear interest at the rate of eight percent per year or the legal rate of interest whichever is the lower rate of interest."

Section 5. (a) **Fees For Application For Industrial Connection and Waste Discharge Permit**

The application fee for a new industrial connection and waste discharge permit shall be $575 per year and shall accompany the application. An existing permitted industrial user must pay the $575 permit fee within thirty (30) days after the issuance of their new discharge permit. This $575 fee will be due on the anniversary date of the permit each year. In addition, each permitted industrial user shall pay a monitoring fee in accordance with permitted parameters in their permit based upon present fair market value of the analysis. These monitoring fees will vary for each industry dependent upon the number of parameters to be monitored by the City and the frequency thereof. If a permit has been canceled due to a previous violation, a restoration fee of $1,150 shall accompany an application for a subsequent permit.

(b) **Fees for Requests for Permit Modifications**

Request for modification to an industrial user permit is $200 per request. Said request must be received by the City's Pretreatment Section at least 45 days prior to the need for the modification. Permit modification fees are non-refundable and must be accompanied by appropriate documentation stating the need for the limit(s) modification, or by a set of plans and specifications outlining the need for additional equipment.

(c) **Fees for Application for Special Use Wastewater Connection and Waste Discharge Permit**

Special Use Wastewater discharge permits for new connections shall vary from $100 to $300 dollars per year dependent upon their discharge volume. An existing permitted user must pay the permit fee within thirty (3) days after the issuance of the permit.

(i) An industrial or commercial user whose discharge is less than 1,000 gallons per day and whose discharge exceeds sewer use ordinance limits will be subject to a $100 annual permit fee.

(ii) An industrial or commercial user whose discharge is between 1,001 – 7,500 gallons per day and whose discharge exceeds sewer use ordinance limits will be subject to a $200 annual permit fee.

(iii) An industrial or commercial user whose discharge is between 7,501 – 15,000 gallons per day and whose discharge exceeds sewer use ordinance limits will be subject to a $300 annual permit fee.

These fees are due on the anniversary date of the permit each year. In addition, each permitted user shall pay a monitoring fee in accordance with permitted parameters in their permit based upon fair market value of the analysis. These monitoring fees will vary for each permitted user dependent upon the number of parameters to be monitored by the City and the frequency thereof.

(d) **Special Use Wastewater Discharge Permits – Marina Pump Out Stations**

Special Use Wastewater Discharge fees for Marina Pump Out waste permits shall be $100 per year and shall accompany the application. An existing permitted user must pay the $100 permit fee within thirty (30) days after the issuance of their new discharge permit. The $100 fee will be due on the anniversary date of the permit each year.

Cancellation of a special use permit due to a previous violation will result in a $50 restoration fee accompanying an application for a subsequent permit.

Section 6. Fees for Grease Interceptor Pumping Variance

Fees for the request of a grease interceptor pumping variance study pursuant to Section 12-112 of the City's Code of Ordinances shall be $220 per variance request.

The written request for a variance to the mandatory 30 day pumping schedule outlined in Section 12-107 of the City Code must specify the criteria the food service establishment is basing the variance request on.

The City reserves the right to establish additional fees as deemed necessary by the Director of Public Utilities to cover any additional labor, equipment use, monitoring, and assistance in the establishment of the variance.

Section 7. Northeast Interceptor Fees To New Hanover County And Town of Wrightsville Beach

New Hanover County Water & Sewer District and the Town of Wrightsville Beach shall be billed bimonthly for wastewater received into the Northeast Interceptor Force Main and treated at the M'Kean Maffitt Wastewater Treatment Plant from collection systems regulated by the same respective governing body at a rate of $0.78 per one hundred (100) cubic feet based upon actual metered flow. The fee represents $0.28 per one hundred (100) cubic feet for transmission within the Interceptor and $0.50 per one hundred (100) cubic feet for treatment.

Sanitary sewer customers discharging wastewater to collection systems owned and operated by the City that are connected to the Interceptor shall be billed at the rate provided in Section 1 of this Article.

In addition to the treatment rate prescribed above, the City may bill the District or the Town additional charges pursuant to Section 3 of this Article if the District or Town accept wastewater which exceeds standard wastewater strength from any individual connection along their respective collection systems.

Within a reasonable time following the close of each fiscal year, the City shall determine as closely as possible the actual costs associated with the maintenance of the Northeast Interceptor and the treatment of wastewater flowing from the Interceptor to the Southside Plant. Following the determination of actual costs for the fiscal year, the City shall allocate actual costs among the City, District, and Town in accordance with terms of the Interlocal Agreements date June 11, 1981, as has been subsequently amended. The allocation of actual costs to the Town and District shall be compared to the actual amounts billed during the fiscal year and the difference charged or credited, as appropriate, at the time of the next schedule billing.

Section 8. Fees for Hauled Wastewater

Fees for the discharge of hauled wastewater pursuant to section 12-130 of the City Code shall be charged at the rate of $0.03 per gallon of wastewater.

In addition to the fees above, the user shall be subject to extra strength sewer charges outlined in Section 3.

ARTICLE C. GENERAL PROVISIONS

Section 1. Billing For Basic User Charges

Charges for basic user fees stated in Chapter VI, Article A, Sections 1 and 2, and Article B, Sections 1, 2, and 3, of the Fee Schedule are billed bimonthly at the bimonthly rate. Fees become due and payable on the date of the bill, and are past due after twenty-five days following the date of the bill.

Section 2. Prorating of Charges

For new accounts, transferred accounts, or final accounts transacted between two scheduled billing dates for bimonthly periods, the minimum bimonthly water and sewer charges, and the fire line connection charges shall be prorated to represent the number of days of the two month period in which service is provided.

Section 3. Charges to Establish Water and/or Sewer Service

In addition to the minimum bimonthly water and sewer charge which must be paid by all users of City of Wilmington public water and sanitary sewer (described in Section 2 of Article A and Section 2 of Article B of this Chapter), all businesses are required to pay a deposit. The amount of the deposit for businesses shall be determined by the Finance Director based upon an estimate of an average bimonthly water and sewer bill for that business. All deposits will be applied to the customer's last bimonthly bill, with any excess to be refunded to the customer. New customers must also pay a Water Service "Trip Fee" explained in section 4 of this article.

Section 4. Water Service Cut on Fees

Water service customers shall pay a $30.00 nonrefundable fee each time their water service is cut on. This fee applies to new customers who are having their water service cut on for the first time, transfers, or in incidences where water service is cut off by the City due to nonpayment of a utility bill and the customer desires the restoration of water service. This fee shall also apply in situations where water service is requested to be left on by a customer when the service should, by policy, be turned off (example: water requested to be left on for a new tenant), since these situations require a site visit by City personnel. If water service is disconnected due to a returned check, the nonrefundable cut on fee amount shall be $50.00. All cuts on fees under this section shall be in addition to any other applicable fees and charges. When the water service is requested to be cut on by a customer, the customer will be given a span of time to meet a serviceman at the residence so that water service may be cut on. If the customer fails to meet the serviceman at the designated time, the customer will be charged $10 for each additional time a serviceman must go back to a residence to cut on water service.

Section 5. Charges for Cut-ons Outside Regular Working Hours

Certain deadlines must be met for water service to be cut on during regular working hours. If a customer fails to meet the appropriate deadline, water service will not be cut on outside regular working hours unless a situation exists that jeopardizes the health of the customer. The City reserves the right to determine if water service will be cut on outside regular working hours. If a serviceman is available and water service is cut on outside regular working hours, a fifteen dollar ($15.00) charge will be applied to the customer's account in addition to the charges of Section 4 of Article C and any other charges and penalties which are due.

Section 6. Penalties for Illegal Cut-on of Water

A fifty dollar ($50.00) penalty will be charged to customers who illegally cut on their own water. In cases where any city equipment is damaged as a result of an illegal connection or water is used through means other than the designated metering device, the customer shall be charged a minimum of one hundred and fifty dollars ($150.00) in addition to any other applicable fees. Civil and criminal penalties also apply.

Section 7. Charges for Resetting of Water Meter

If the water meter is removed due to nonpayment of a utility bill, upon request to have the service restored, the customer shall pay a $25.00 fee for the cost of removing and resetting the water meter in addition to any other applicable charges.

Section 8. Deposits for Special Meter Tests

When special meter tests are performed on a 5/8 inch (or ¾ inch) meters at the request of the customer, he or she shall pay a thirty five dollar ($35.00) fee which will be refunded to the customer if the tested meter does not meet the American Water Works Association standards. All meters that are one inch or larger will be tested at actual cost. No refunds shall be made if the meter meets these standards.

Section 9. Charges for Refund Requests and Revisions to Applications

A $25.00 processing fee shall be charged to customers requesting refunds or revisions to previous applications for service.

ARTICLE D. WATER AND SEWER FACILITY FEE SCHEDULE

Section 1. Water and Sewer Facility Fees

As provided in Article V of Chapter 12 of the City Code, any person undertaking any development to be connected to the City's water and/or sewer systems shall pay a fee in accordance with the following schedule:

For the purposes of this Article, the Resolution of Consideration Area (RCA) shall be that area being considered for annexation by the City of Wilmington as described in Resolutions adopted from time to time by the Wilmington City Council pursuant to the provisions of G.S. 160A-49. Facility fees for water shall be based on water meter size as follows:

Meter Size (Inches)	Rate Inside City and Inside RCA	Rate Outside RCA
5/8	$ 860	$ 1,720
¾	$ 860	$ 1,720
1	$ 2,675	$ 5,350
1.5	$ 5,350	$ 10,700
2	$ 8,560	$ 17,120
3	$ 17,120	$ 34,240
4	$ 26,750	$ 53,500
6	$ 53,500	$107,000
8	$ 85,600	$171,200
10	$133,750	$267,500

Facility fees for sewer shall be based on water meter size as follows:

Meter Size (Inches)	Rate Inside City and Inside RCA
5/8	$ 810
¾	$ 810
1	$ 2,525
1.5	$ 5,050
2	$ 8,080
3	$ 16,160
4	$ 25,250
6	$ 50,500
8	$ 80,800
10	$126,250

FACILITY FEES INSIDE CITY AND RESOLUTION OF CONSIDERATION AREA

Households with annual incomes within the eligibility limit set forth in the N.C.G.S. 105-277.1 whose head is sixty-five years of age or older or is totally and permanently disabled, whose water

service has been provided through the neighborhood services connection program, shall pay a fee of $1,000 for a ¾" service.

Where the City installs a manifold assembly water service connection for a customer the following charges shall apply:

¾" Manifold Assembly

Line Size	Line Fee	Service Manifold Assembly Fee	Meters Quantity	Meter Fee	Total
1 inch	$1,400	$ 200	2	$ 160	$1,760
1 ½ inch	1,800	300	3	240	2,340
1 ½ inch	1,800	400	4	320	2,520
1 ½ inch	1,800	500	5	400	2,700
1 ½ inch	1,800	600	6	480	2,880
1 ½ inch	1,800	700	7	560	2,060
1 ½ inch	1,800	800	8	640	3,240
1 ½ inch	1,800	900	9	720	3,420
1 ½ inch	1,800	1,000	10	800	3,600
2 inch	2,350	1,100	11	880	4,330
2 inch	2,350	1,200	12	860	4,510
2 inch	2,350	1,300	13	1,040	4,690
2 inch	2,350	1,400	14	1,120	4,870
2 inch	2,350	1,500	15	1,200	5,050
2 inch	2,350	1,600	16	1,280	5,230

1" Manifold Assembly

Line Size	Line Fee	Service Manifold Assembly Fee	Meters Quantity	Meter Fee	Total
1 ½ inch	$1,800	$200	2	240	2,240
2 inch	2,350	300	3	360	3,010
2 inch	2,350	400	4	480	3,230
2 inch	2,350	500	5	600	3,450

Customers who apply for both water and sewer services at the same address shall receive a ten-percent (10%) discount off their water service connection charges.

A discount in the connection fees may also be granted to customers inside the City limits if service connections made in bulk as part of a City-initiated service extension result in lower construction costs.

When the City is only required to provide a tap or set a water meter and inspect the installation for a customer, the following charges shall apply:

Appendix C

City of Wilmington
Enforcement Response Plan

1.0 Introduction

Federal and State pretreatment regulations, as well as Part III (B)(6) of the City of Wilmington's NPDES permits requires the City to take timely and effective enforcement actions against significant industrial users (SIU's) for failure to comply with pretreatment standards and requirements. Federal and State regulations also require each POTW, with an approved pretreatment program, to develop and implement an enforcement response plan (ERP). By regulation, this plan must:

(1) describe how the POTW will investigate instances of noncompliance
(2) describe the types of escalating enforcement responses the POTW will take in response to all anticipated types of SIU violations and the time periods within which responses will take place
(3) identify the official(s) responsible for each type of response
(4) adequately reflect the POTW's primary responsibility to enforce all applicable pretreatment requirements and standards

The purpose of the City of Wilmington's enforcement response plan is two-fold: first, to ensure compliance with Federal and State regulation; second, to ensure that there is timely enforcement of pretreatment standards and requirements and that all industries are treated in a fair and equitable manner.

Violations of the City of Wilmington's regulations will be assessed points in accordance with their severity and number as described in the Enforcement Response Guide. Point assessments will be managed in accordance with the Point Assessment Criteria. The Enforcement Response Timetable is an indication of maximum time frames for initiation of enforcement actions by the City.

2.0 Enforcement Authorities Available to the City

Division 5 of the City of Wilmington's Sewer Use Ordinance gives the Director of Public Utilities the authority to take a wide variety of enforcement actions. Each of these actions can be viewed as having a certain degree of punitiveness. The City's Enforcement Response Plan will utilize all of the enforcement tools available to the Director in the system that outlines escalating enforcement actions dependent on the nature of the violation and the cooperativeness, or recalcitrance, of the violator. The following is a list of remedies authorized by the Sewer Use Ordinance and ordinance citation. It is presented in order of punitiveness, least punitive first and most punitive last.

1. Notice of Violation {Sec. 12-141(a)}
2. Consent Order {Sec. 12-141(b)}
3. Show Cause Order/ Hearing {Sec. 12-141(c)}
4. Administrative Order {Sec. 12-141(d)}
5. Emergency Suspension (Temporary) {Sec. 12-141(e)}
6. Termination of Service (Permanent){Sec. 12-141(f)}
7. Other Remedies {Sec. 12-143}

In addition to the seven tools listed above, Section 12-142 of the Sewer Use Ordinance authorizes the Director to assess civil penalties of up to $25,000.00 per day per violation.

Civil penalties are normally used in conjunction with one of the other seven activities listed above and the punitiveness of the penalty depends on the dollar amount.

In addition to the actions listed above, a user who violates the provisions of NCGS 132-215.6B may be referred by the Director to the District Attorney for possible criminal prosecution.

Adjudicatory hearing procedures regarding permit decisions, civil penalties, and administrative orders may be found in section 12-92(h) of the Sewer Use Ordinance.

3.0 Noncompliance Determinations

The Environmental Compliance Staff will generally investigate SIU compliance four ways:

(1) on site inspections of the SIU
(2) review of SIU self monitoring data
(3) review of compliance data collected by the City
(4) violations discovered through the actions of other City or Public Utilities Department units and referred to ESD

Using the Sewer Use Ordinance, as well as guidance that has been provided by EPA and the Division of Water Quality, the Environmental Compliance Staff has identified four categories of permit noncompliance (The list is not inclusive, but serves as a general list of anticipated types of noncompliance). Below is a discussion of the types of violations within each category and the Environmental Compliance Staff member responsible for the initial compliance determination for each violation type.

3.1 Unpermitted Discharges

Unpermitted discharges can result from several activities. A SIU might fail to obtain a permit prior to discharging to the wastewater treatment plant. A SIU might discharge to a point in the collection system which is not identified in the SIU's permit. A SIU might begin to discharge a pollutant that was previously identified as absent by the industry. Also, a SIU might continue to discharge when its permit has expired.

Unpermitted discharges will normally be discovered during the inspection of an industry. The City's Environmental Compliance Officer will be responsible for determining the severity of the violation during the inspection. The severity will normally depend on whether the unpermitted discharge poses an immediate threat to the POTW or the environment and whether the industry was unaware of the requirements or was seeking to avoid the regulations.

3.2 Permit Noncompliance

Noncompliance with a SIU's pretreatment permit falls into four areas: limits violations; monitoring violations; reporting violations; and violations of permit conditions.

3.2.1 Permit Limit Noncompliance

Permit limit violations are when discharges are greater than permitted limits as set forth in the permit and the severity depends on whether the violation is considered Significant Noncompliance (SNC). SNC is defined in North Carolina's General Pretreatment Regulations {15A NCAC 2H.0903(b)(35)}. It is the Environmental Compliance Supervisor's responsibility to evaluate compliance with pretreatment limitations each time data is received and at the end of each semi-annual reporting period.

3.2.2 Self-Monitoring Noncompliance

Noncompliance with monitoring occurs when a SIU fails to conduct all of the self-monitoring required by its pretreatment permit. The severity of the violations depends on how much self-monitoring was actually completed. If the SIU conducted less than 80% of the sampling and analysis required in a six month period, the violation is considered significant or SNC. This also includes a User who does not resample per their permit when a limit violation occurs.

Each time a self-monitoring report is received from a SIU, it is the responsibility of the Environmental Compliance Supervisor to compare the report to the permit requirements and to evaluate compliance with monitoring requirements.

3.2.3 Reporting Violations

Reporting violations occur when a SIU fails to provide information that is required by the permit within the time period stated in the permit or when the information is incomplete or false. Reports required by the permit can include self-monitoring reports, spill prevention plans, baseline monitoring reports, ninety-day compliance reports, and sludge handling plans. In the case of late or incomplete reports, the severity of the violation depends on the length of time the report is late. If a complete report is not submitted within 30 days of the due date, the violation is considered SNC. Knowingly submitting false information is considered a significant violation.

It is the Environmental Compliance Supervisor's responsibility to track the report due dates included in the pretreatment permits and to evaluate compliance in terms of the tardiness and completeness of the submission.

3.2.4 Violations of other Permit Conditions

The pretreatment permits issued by the City contain several conditions that do not fall into the category of limits, monitoring or reporting requirements. For example, the pretreatment permit prohibits slug loads and requires the SIU to properly operate its pretreatment facility. Violations of these conditions would normally be discovered as part of an inspection or in conjunction with another enforcement action. The Environmental Compliance Supervisor is responsible for evaluating compliance with these requirements.

3.3 Violations of Enforcement Orders

Violations of enforcement orders are actually very similar to pretreatment permit noncompliance in that they can be broken down into limits violations (interim limits), monitoring violations (increased monitoring required by the order) and reporting violations. In addition, violations of enforcement orders would include missing milestone dates and noncompliance with final limits once the order has expired. However, all violations of enforcement orders with the exception of interim limits violations are considered SNC. Interim limits violations would not be considered significant if they did not meet the criteria listed in 15A NCAC 2H.0903(b)(35) (a) (b) and if the SIU paid the stipulated penalty assessed.

Once a SIU has been put on an enforcement order, the City's initial response to violations will be to notify the SIU of the violation and to collect the stipulated penalty outlined in the order.

It is the Environmental Compliance Supervisor's responsibility to track compliance with the order and assess the penalty. The Environmental Compliance Supervisor will determine whether the violations are so severe as to warrant escalated enforcement. For example, an escalated enforcement action would be needed if it was clear that the SIU could no longer meet the remaining milestone dates in the existing order.

4.0 Response to Noncompliance

In order to ensure that the City is taking timely and effective enforcement actions, three tools will be employed:

1. an enforcement response guide
2. point assessment criteria
3. penalty schedule

The purpose of the enforcement response guide is to identify initial response and time frames for each of the types of violations discussed in Section 3.0. The point assessment criteria explains how points are managed. The penalty schedule explains penalties associated with points accrued during a 180-day (semi-annual) period.

POINT ASSESSMENT CRITERIA

For the purpose of managing point assessments, the following shall apply:

A. Points shall be accumulated on a 180-day (semi-annual) basis. January 1- June 30; July 1-December 31.

B. Penalties shall be assessed after 4 points are accumulated during a 180-day period. Costs of Show Cause Hearings shall be paid regardless of accumulated points.

C. When the total number of points equals or exceed 10 points during the 180-day period, the Environmental Compliance Supervisor shall determine appropriate enforcement actions that may include assessment of fines, revocation of the permit, and/or termination of service.

D. Any expenses shall be in addition to penalties, fines, etc. and shall be determined After the Show Cause Hearing.

E. Point assessments shall be determined by the Environmental Compliance Supervisor or a duly authorized agent.

F. When a permit is modified to reflect a change in ownership, all accumulated points are automatically transferred to the new owner.

G. Deficiencies or violations occurring as a result of circumstances beyond the Permitee's reasonable control as determined by the City of Wilmington will not be assessed points.

H. Significant Non Compliance shall be as defined in the Sewer Use Ordinance.

I. The term "days" or "day" shall be defined as the "due date" and shall be a business day. If the "due date" falls on a weekend or legal holiday, the next business day becomes the legal "due date".

J. The term "report" shall be defined as any required submission as specified in the Sewer Use Ordinance.

ENFORCEMENT RESPONSE GUIDE

Administrative Violations	**Enforcement Response**
1. Late submittal of required reports (Calibration, Self-Monitoring, etc.)	
* More than 30 days	2.0 pt. NOV
2. Similar reports (#1 above) are repeatedly (third occurrence in 180 days) late or not received	4.0 pts. NOV
3. Failure to report spill or new/changed discharge	
* No harm or evidence of intent	1.0 pt. NOV
* Results in harm, no evidence of intent	3.0 pts. NOV & Show Cause
* Evidence of intent (with or without harm) **or** repeated (third occurrence in 180 days) failure to report	5.0 pts. Show Cause
4. Intentional falsification of required report(s)	4.0 pts. Show Cause
5. Inadequate record keeping	
* Failure to maintain logs, inspections or other reports as required	1.0 pt. NOV
* Failure to maintain records for 3 years	4.0 pt. NOV
6. Late submittal of compliance schedule and/or required milestone updates	
* Less than 30 days	1.0 pt. NOV
* More than 30 days	2.0 pts. NOV
7. Compliance schedule milestones	
* Less than 30 days delayed without sufficient cause	1.0 pt. NOV
* More than 30 days delayed without sufficient cause	3.0 pts. NOV &/or Show Cause
* Final milestone delayed without sufficient cause	4.0 pts. NOV & Show Cause
8. Late response to NOV or other official notification	1.0 pt. NOV
* Repeated occurrence (third occurrence within 180 day period)	2.0 pts.
9. Failure to report a violation within 24 hours of becoming aware of it	4.0 pts. NOV

Technical Violations	**Enforcement Response**
1. Failure to correct deficiency within timeframe as required by the City	2.0 pts. NOV
2. Failure to analyze or reanalyze (Per test method) all required parameters; failure to sample or resample (Per sample type) all required parameters	
* Initial	1.0 pt. NOV
* After NOV	2.0 pts.NOV
3. Failure to install or properly maintain sampling point, monitoring and/or metering equipment	2.0 pts. NOV
4. Entry denial, limited access and/or refusal to present records	
* Initial	2.0. NOV
* After notification	4.0 pts. NOV &/or Show Cause
5. Failure to mitigate noncompliance or halt production	
* No harm	1.0 pts.NOV
* Harm caused	4.0 pts. NOV & Show Cause
6. Illegal discharge (Permitted Facilities)	
* No harm caused and no intent	1.0 pt. NOV
* Harm caused, no intent	3.0 pts. NOV & Show Cause
* No harm caused, evidence of intent	4.0 pts. NOV & Show Cause
* Harm caused, evidence of intent	8.0 pts. NOV & Show Cause
7. Illegal discharge (Non-Permitted Facilities)	
* IU unaware of requirement, no harm caused	1.0 pt. NOV
* IU aware of requirement, no harm caused	2.0 pts.NOV
* IU unaware of requirement, harm caused	3.0 pts. NOV & Show Cause
* IU fails to apply for permit after receiving notice	4.0 pts. NOV & Show Cause
* IU aware of requirement (evidence of intent) and harm caused	8.0 pts. NOV & Show Cause
8. Non-permitted discharge (Permitted Facilities)	
* IU has not submitted permit application or reapplication within required timeframe or failed to notify of additional or changed waste stream	1.0 pt. NOV
* IU fails to apply for Permit Addendum after receiving notice	3.0 pts. NOV & Show Cause

Technical Violations	**Enforcement Response**
9. Failure to follow special conditions section of Permit	
* Initial	1.0 pt. NOV
* After notification	3.0 pts. NOV &/or Show Cause
10.Flow meter not operable during monitoring period	
* isolated	1.0 pt. NOV
* repeated (more than 3 times in 180 day period)	2.0 pts. NOV
11. City of Wilmington or Categorical permit limit exceeded (per calendar month)	
*Isolated	1.0 pt. NOV
*Chronic	
-no harm	3.0pts. NOV& additional monitoring
-harm caused	5.0 pts. NOV, additional monitoring & Show Cause
*Technical Review Criteria (TRC) violation (no harm)	
-Isolated	3.0 pts. NOV& additional monitoring
-Chronic	5.0 pts. NOV & additional monitoring & Show Cause
*TRC violation (harm caused)	7.0 pts. NOV & Show Cause

The terms “Chronic” and “Technical Review Criteria” are as defined in the City of Wilmington Sewer Use Ordinance.

The terms “mitigate”, “harm caused” and “sufficient cause” are as determined by the City of Wilmington.

Any permit violations not specified above are subject to the Environmental Compliance Supervisor’s discretion of point assessment.

ENFORCEMENT RESPONSE TIMETABLE

ENFORCEMENT RESPONSE	**TIMETABLE ***
INFORMAL RESPONSES	
NOTICE OF VIOLATIONS	14 DAYS
FORMAL RESPONSES	
SHOW CAUSE NOTICE	30 DAYS
COMPLIANCE SCHEDULE	30 DAYS
MONETARY PENALTY	60 DAYS
REVOKE PERMIT/SUSPEND SERVICE	60 DAYS

* Indicates the maximum amount of time in which the City shall initiate enforcement action after detection or knowledge of the deficiencies or violation(s). Violation(s) or deficiencies that endanger health, property or the environment are considered emergencies and shall receive immediate attention.

NOTICES OF VIOLATIONS WILL INCLUDE POINT (S) ASSESSED FOR THE VIOLATION.

PENALTY SCHEDULE

The following is a penalty schedule the City of Wilmington will follow when judging compliance at the end of the 180-day period. Penalty assessment will begin once 4 points have been accrued during the 180-day period. This schedule assesses penalties based on various types of administrative and technical violations in accordance with the Enforcement Response Plan. Penalties will be assessed within the proposed ranges, taking into account the particular circumstances of each violation and the timeliness of the User's actions to achieve compliance. Penalty amounts are based on whether or not a user is considered "significant" as required by Federal Law (See definition below).

PENALTY RANGES (Per violation)

POINT VALUE	NON-SIGNIFICANT INDUSTRIAL USER	SIGNIFICANT INDUSTRIAL USER
4.0	$100-500	$500-1,000
5.0	$500-1,000	$1,000-2,000
6.0	$1,000-1,500	$2,000-3,000
7.0	$1,500-2,000	$3,000-4,000
8.0	$2,000-2,500	$4,000-5,000
9.0	$2,500-3,000	$5,000-6,000
10.0	$3,000-3,500	$6,000-10,000 + fines

Any Show Cause Hearing will have a $500.00 penalty assessed.

These penalties will be assessed by the City of Wilmington.

* Significant Industrial User- An industrial user which:
  1) is subject to categorical pretreatment standards.
  2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW.
  3) contributes a process waste stream which makes up 5% or more of the average dry weather hydraulic or organic capacity of the POTW.
  4) is designated by the City on the basis that the industrial user has a reasonable chance for adversely affecting the POTW's operation or for violating any pretreatment standard or equipment.

Appendix D

Personnel Policy #2
Effective Date: 09/06/02
Supercedes: 05/08/00, 07/01/99, 05/19/98
City Manager:

I. Purpose

The purpose of the classification and compensation system is to support the recruitment and motivation of qualified and productive employees and to encourage and reward activities that make a positive difference in the lives of residents of the City of Wilmington.

II. Administration of Position Classification

The City Manager shall administer and maintain the classification plan assigning and reassigning positions to classes on the basis of the kind and level of duties and responsibilities. The City Manager shall administer and maintain written classification specifications, which shall include the duties, responsibilities, skills, and abilities for each class, to be used in establishing pay and appointing and evaluating employees.

III. Classification Specification

The Classification Specification provides a general description of essential functions, related tasks, and minimum acceptable qualifications for each classification. Distinction in classifications is based on differences in essential functions and related responsibilities. The differences between jobs that perform similar kinds of work, but at a clearly different level of complexity will be clarified in the class specifications. A variety of similar types of work can be included in one class specification, and skill based differences can be accommodated within the broad class. The classification will be designed so that City managers can assign employees to different work tasks quickly and easily without having to reclassify the job each time that work changes. Classifications are assigned to salary grades in the Pay Plan to distinguish compensation for varying levels of decisions, responsibilities and qualifications.

IV. Administration of the Pay Plan

The City Manager shall administer and maintain the Pay Plan. The Pay Plan is intended to provide appropriate compensation for all classifications. Consideration is given to the relationship to other classifications; to general rates of pay for similar employment in the private sector and in other public jurisdictions; to changes in the cost of living; to financial conditions of the City and other factors. The Plan is subject to annual review through comparative study of all factors affecting the pay plan and to changes in the plan as appear to be warranted.

The City of Wilmington has the following expectations of its Pay Plan:

- To provide a compensation system of pay grades and pay ranges that will reflect the labor market for various jobs in the City.

- To aid in the effective recruitment of new employees and recognizing applicants and employees with greater credentials than required by providing department directors flexibility in providing market competitive starting pay.
- To aid in the retention of employees who contribute to the success of the City, by offering market competitive pay and opportunities for continued pay growth.
- To link the performance of employees to the objectives of the City by basing salary growth on the evaluation of performance and provide flexibility to departments in the performance management to recognize varying levels of individual performance with higher levels of pay to employees performing above standard.

V. Pay Plan Structure

The City pay plan shall be structured as follows:

a) Each job classification shall be assigned to a pay band based on job evaluation methodology. The pay bands will reflect current market conditions and internal equity. The width of the salary range will be based on the level of the job classification and the market information. The difference between market average salary of the pay bands will average seven percent.

b) The market rate will reflect the actual average pay of other employees working in the benchmark positions for other similar employers. The breadth of the pay range will be established from the survey results, making sure that the system is logical and allows employees to receive pay increases for demonstrated performance in the job. The minimum of the pay range will not be greater than 10% below the market average salary.

c) Sworn police and fire occupations up to the first promotional level and all other classifications designated as non-exempt for overtime under the Fair Labor Standards Act, will have ranges that are divided into steps from the minimum of the pay range up to the market average salary. The differences between the steps will be no less than 2% and no more than 5%. Movement to a new step will be considered at annual increase time unless performance warrants withholding the increase. Future annual salary movement, above the market rate, will be based upon meritorious performance.

d) Certain classes, at the discretion of the department director and Human Resources Department, will develop skill-based steps from the minimum to the market average salary. The differences between the steps will be no less than 2% and no more than 5% and determined with the establishment of each skill-based program. Employees will be eligible for skill based step increases as defined skills for the classification are obtained based upon the defined performance standards identified by the department. Future annual salary movement, above the market average salary, will be based upon meritorious performance.

e) Classifications designated as exempt will be eligible for movement through the range based upon meritorious performance and the guidelines established annually at performance increase time.

VI. New Employees

Appointments of outside applicants to vacant positions will be made at the effective minimum rate of the pay grade unless training and/or experience exceed the requirements of the position. In such case, the department director should evaluate the extent to which the credentials are different and may then authorize a starting salary up to the market rate of the pay grade. Non-exempt employees hired below the market rate will be placed on a step within the pay range. The department director in conjunction with the Human Resources Director may recommend to the City Manager a hiring rate anywhere within the range if credentials warrant. Hiring above the market rate will be justified only when the department director can document recruiting difficulties, and/or a candidate whose qualifications clearly exceed the expectation of the class and the pay of other current employees in the same classification.

VII. Appointment Resulting from Voluntary Transfers

Appointments of current employees to regular vacant positions as a result of a competitive process that includes outside applicants will be considered a voluntary transfer, whether it is a lateral, promotion or demotion move.

The department director, in conjunction with the Human Resources Department, will recommend a salary for the employee within the minimum-to-market target range. The department director should recommend an appropriate salary recognizing education, experience and internal equity considering the title, the department and the market, but no less than the minimum of the pay grade. Non-exempt employees below the market average for the classification must be placed on a step within the pay grade.

The department director should not recommend a salary that causes internal equity issues with other staff within the department. The department director may not increase the salary of another employee within the department to equalize a pay equity issue caused by a voluntary transfer. The department director should not expect future considerations for salary adjustments or salary offers based upon the conscious decision to approve a prior salary offer that created internal equity issues within the department.

Hiring above the market rate must be approved by the City Manager and will be justified only when the department director can document recruiting difficulties, and/or a candidate whose qualifications clearly exceed the expectation of the class and the pay of other current employees in the same classification. Typically a pay increase for an internal candidate will not exceed fifteen percent. No salary offer may exceed the maximum of the pay range.

VIII. Apprenticeship Appointments

In those situations where the City's recruits for an *Apprenticeship Appointment* an external candidate or internal promotion will be hired at the designated minimum of the pay range.

The department director shall review the progress of each employee in an apprenticeship status at the intervals designated in the approved apprenticeship program. The employee will be eligible for salary increases based upon satisfactorily meeting the established benchmark goals. Apprenticeship employees will only be eligible for performance increases after they reach the market rate for the position.

IX. Temporary Employees

Temporary employees must be hired at least at the minimum of the pay range. Department directors may authorize adjustment of the pay of a temporary employee at any time that the pay plan is adjusted. However, temporary employees are not eligible to participate in any pay for performance system.

X. Reclassifications

When an employee's position is audited and it is determined that the position functions at a level warranting a different classification, the auditor will recommend that the employee be reclassified to the appropriate level position. If the reclassification action is approved by the City Manager, the employee will be eligible for an increase and the department director may recommend an increase based upon education, experience or internal equity. The new salary will be within the new salary range. A salary above the market average salary will be justified only when the department director can document recruiting difficulties, and/or a candidate whose qualifications clearly exceed the expectation of the class and the pay of other current employees in the same classification. Typically the pay adjustment for a reclassification to a higher classification will not exceed fifteen percent.

XI. Temporary Change in Pay

Current employees who are temporarily reassigned to a different position due to organizational needs, or are serving in an "acting capacity" may have a temporary change in their pay to reflect these circumstances.

For employees who are temporarily reassigned to a higher level position, or serve in an "acting capacity" requiring them to perform substantially all of the work of a higher class for a period exceeding 30 work days will be eligible to receive an increase. The salary increase will be equal to 5% of the market average salary for the higher classification and will begin 30 days after such time that the work in the higher classification is begun.

XII. Reassignment

If approved by the City Manager, employees who are permanently reassigned to a different position the department director, in conjunction with the Human Resources Department, will recommend a salary for the employee. The recommended salary will be within the new range for the position. The recommended salary will take into account the assigned duties, education, experience, internal equity within the department and market. Typically, the pay adjustment will not exceed fifteen percent.

XIII. Annual Salary Increases

If approved in the budget by the City Council, employee salaries will be adjusted as follows:

Structure Increases:

The salary structure will be adjusted based on salary information from the market. All exempt and non-exempt employees, who are performing at a satisfactory level and whose salary is below the new market average, will receive the percentage increase that the salary structure is adjusted.

Performance Increases:

a) All non-exempt employees, who are performing at a satisfactory level and whose salary is below the new market average, will be eligible for a performance increase to the next step in the pay range. If the employee is not on a step, the employee will be eligible to receive the same percentage increase as exist from step one to step two of the salary range.

b) All non-exempt employees above the market average and all exempt employees whose performance exceed expectations will be eligible for a performance increase as per the guidelines established for that year. Typically, this increase will not exceed a maximum of 8% increase to the employee's base pay based for performance that exceeds expectations as defined by the department.

c) All employees during the year will be eligible for a bonus based on the department director's recommendation and within the constraints for the department's budget. Bonus increases will be reviewed by Budget Office for availability of funds and must be approved by the City Manager.

XIV. Withholding Pay and Classification Plan Changes Due to Performance

If the department director determines that the behavior or performance of an employee is not meeting identified expectations, the department director should begin the progressive discipline process to correct the behaviors or performance issues. Progressive discipline is used to deal with specific events in performance management. Annual performance awards should be based upon the evaluation of the employee's total performance to include progressive discipline events. Additionally, the department director may recommend that any salary adjustment (structure or performance) for an employee is withheld. The department director will be required to provide to the Human Resources department documentation showing a corrective action or discipline of the employee for the performance issue or special circumstance.

Employees whose evaluation indicates performance at "less than expected" performance level will not receive any type of salary performance increase for that entire year. Corrective action should be spelled out in the progressive discipline process or the annual performance evaluation and the performance will be reviewed once again within three to six months. Employees who continue to perform at "less than expected" performance shall have performance issues documented and corrected utilizing the City's Progressive Discipline Policy and may be subject to dismissal.

XV. Pay Structure Review

Compensation levels will be established to reflect the labor market for different types of jobs in the City.

a) The labor market will include public and private sector employers that the City competes with for employees, taking into account a reasonable geographic recruiting market for such personnel. Public organizations will be matched on characteristics such as size, growth, tax base, cost of living, number of employees, and type of community.

b) Total compensation, including benefits and extra compensation typically provided by similar employers, will be compared to the extent possible.

XVI. Salaries Exceeding the Maximum of a Pay Grade

An employee, whose salary exceeds the maximum of a pay grade as a result of a demotion, reduction in pay grade or reclassification will have his/her salary reduced to the new maximum. The employee will not be eligible for any increase until such time as the employee's salary is less than the maximum of the new pay grade.

XVII. Pay for Part-time Work

All employees exempt and non-exempt appointed for less than full-time service will be paid an hourly rate. The rate for exempt employees shall be determined by converting the established annual salary to an hourly rate.

XVIII. Overtime

Overtime hours are all hours worked by a non-exempt employee during a given workweek (or a given work period for public safety employees consistent with the 207k exemption) that exceed the maximum non-overtime hours established by or pursuant to the Fair Labor Standards Act for such workweek (or work period). Included in any calculation of overtime will be only hours worked on regularly scheduled work days, special events, holidays, planned activities, or unanticipated changes in work schedules. Not included in hours worked will be work on days covered by Inclement Weather policy closure, days paid as vacation, sick leave and holiday or paid administrative leave.

The department director (or designee) must authorize overtime in accordance with established budgetary and fiscal control procedures. Overtime shall be distributed equally as practical among non-exempt employees within the same classification in the department, division, section, or shift regardless of age, sex, race, color, creed, religion, national origin, or disability. Employees who work overtime without authorization will be counseled by the supervisor and subject to disciplinary action if the behavior continues.

Exempt employees required to work outside of his/her normal schedule will receive no additional pay except as allowed under other City policies such as Inclement Weather policy.

The City Manager shall identify exempt and nonexempt classifications in the pay plan.

XIX. Compensatory Time

The City does not allow compensatory time off in lieu of overtime. All hours worked by a non-exempt employee should be paid during the pay period in which the employee worked. Only vacation, sick leave and classifications approved for accruing holidays may accrue hours for future use and payment.

A department director my approve an alternate work schedule within the work week (or work period for public safety and health employees covered under the 207k exemption) to reduce the number of total hours worked in the work week to at or below the overtime threshold for the employee. No hours worked in one workweek or work period should be carried to another workweek or work period.

Exempt employees are required to work those hours necessary to ensure the satisfactory performance of their department or work unit. Exempt employees are paid a salary for the position and do not receive additional pay for working additional hours over the regular scheduled hours except for work paid under the inclement weather policy.

XX. Standby Duty

Emergencies and other conditions of a short duration, which require corrective action at the earliest time, may necessitate having personnel available for service outside the regular work hours on a continuing, but limited basis. Standby duty must be specifically designated as such and must be approved by the department director in accordance with established budgetary and fiscal control procedures. The following procedures will apply to any employee placed on such duty shall:

a) Leave a phone number where he or she can be reached by telephone or by other communications device; and

b) Report to the work site with the necessary equipment within a one- (1) hour period and be capable of performing assigned duties.

c) When called to work, nonexempt employees shall be compensated in accordance with the City's policy on overtime for actual hours worked. Employees may be reimbursed for mileage or provided transportation between the work site and residence should circumstances and conditions warrant. In addition, non-exempt employees placed on Standby Duty shall receive an additional one (1) hour's pay for Standby Duty outside the employee's established workday within a twenty-four (24) hour period and two (2) hours additional pay for each twenty-four hours of Standby Duty on scheduled days off or holidays.

d) Exempt employees who are called to work or required to be on stand-by will receive no additional compensation.

XXI. Called to Service

Every employee of the City is subject to be called into service when needed. The City may require that word be left at home or with the city where the employee might be reached by phone or to be available by other communication devices. Employees shall not receive any additional pay for being subjected to being called into service. Non-exempt employees will be paid for all hours worked and subject to the overtime prevision of the policy only when the employee exceeds the overtime thresholds for his/her position for the work week or period. Exempt employees who are called to work will receive no additional compensation.

XXII. Bonuses

At the department director's discretion, an employee may receive recognition through a cash bonus/award for the employee's efforts or activities related to an additional project or program. All bonuses are subject to the availability of departmental funding and approval of the City Manager.

XXIII. Payroll Deductions

Only payroll deductions specifically mandated by Federal or State act, or as authorized by the employee, may be deducted at each pay period from each employee's pay.

Appendix E

WO Company: 01A City of Wilmington (ACTIVE FLT)
WO Department: 517330 PUBUTLY/US-SWR MNT&CONST 0517330512
WO Shop: 01 FLEET MANAGEMENT GARAGE

TECHNICIAN COPY

WO#: 0000065721
Date In: 02/24/2006 09:06
Date Out: 00:00
WO Status: S Last WO#:0000065721
WO Priority: 01 Last WO Date: 02/24/2006
Track DownTime: Y Operator: LRV

Equipment: 7011 License: 49169-S

Location: Color: W
Year: 2003 Serial: 1FDXF46S73ED84567
Make: FORD Engine: 6.8L
Model: F450
Class: VTSR: TRUCK, SEWER RODDER

Tire Size 1: 425/65R22.5
Tire Size 2: 11R22.5
Transmission: AUTOMATIC
Fuel Type1: U:UNLEADED
Fuel Type2:
Fuel Type3:
Oil Capacity: 0.000
Fuel Cap1: 50.000
Fuel Cap2: 0.000

GVW: 15000
EAC: 24
Department: 517330:PUBUTLY/US-SWR MNT&CONST 0517330512
Company: 01A City of Wilmington (ACTIVE FLT)
Site: OC UTL:01A City of Wilmington (ACTIVE FLT)
Monitor Group:

Comments:

HARBEN 4018DPD300P JETTER $36752.00
W/HATZ ENGINE
JETTER--ON PO # 310473

METERS

WO Meter	Reading	Override?	Eq Meter	Actual	LTD
M	51132		M	51132	51132

PM SERVICE

Type	Cycle	Next Due	Description
A	¤ - MILES	50832	LUBE,OIL,FILTER CHANGE
A	¤ - MONTHS	11/30/2006	LUBE,OIL,FILTER CHANGE
I	¤ - MONTHS	05/26/2006	ANNUAL NC/DOT INSPECTION

WARRANTY INFORMATION

Type	Cycle	Date Expires	Description

REPAIRS

RTY	Description	Status	MID	Est. Labor	Shop
2032000001BN	General Non-PM Related Repair | Cranking System | System | Diagnosis | Billable	C	009	0.00000	01
PMA BS	PM Service | PM A Service | Billable | Scheduled	0		0.00000	01

NOTES

02/24/2006 @ 09:06:23
BEING TOWED IN FOR NO RUN CONDITION.....LV
02/24/2006 @ 16:11:01
REPLACED SPARK PLUGS,STILL WOULD NOT RUN WRIGHT TOOK CAT CONVETER LOOSE RAN BETTER
GOING TO BLACKS TIRE MONDAY TO PUT ONE ON.
PM DUE Sublet to Capital Ford

03/03/2006 @ 08:41:36 Greg at Capital Ford called and said the converter is not bad. He said that there is no compression on one bank of the engine. Est $600-$650 to tear down and roughly $1500 to repr. If they run into any additional costs, they will advise us after they get into the engine.

03/[illegible]/2006 @ 11:27:56 Greg called, said that the top side of eng will not hold oil pressure.They have to replace the engine. Ford will help with cost. Our cost will be around $4,000 total.

Appendix F

DEPARTMENT OF PUBLIC UTILITIES

WATER & SEWER DIVISION

DAILY LOG

DATE: _____ THE _____ OF _____ 19___

NAME	W.O.#	HRS.	W.O.#	HRS.	W.O.#	HRS.	W.O.#	HRS.	TOTAL HOURS

W.O.#	DETAILED JOB DESCRIPTION	ARRIVAL TIME	DEPARTURE TIME	TOTAL HRS.
	This form is used for listing all daily activities with a time frame - (green for sewer) Each truck keeps a running log sheet.			

FOREMAN: _____